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Laura Gallardo Ortín

# Peer relationships and perceptions during adolescence: academic and psychological implications

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Autor

Laura Gallardo Ortín

Director/es

Barrasa Notario, Ángel

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## ACADEMIC AND PSYCHOLOGICAL IMPLICATIONS

Tesis Doctoral

Laura Gallardo Ortín

Director: Dr. Angel Barrasa Notario

Teruel, diciembre 2015

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*Con gente como esta, me comprometo a lo que sea,*
*ya que con haber tenido a esta gente a mi lado,*
*me doy por bien retribuida.* (Mario Benedetti)

# CONTENIDOS

# INTRODUCCIÓN GENERAL

*"Un 41% de los alumnos de Aragón repite algún curso antes de acabar la ESO. Sólo el 59% de los alumnos alcanza el cuarto curso de ESO con 15 años, mientras que el resto repiten alguna vez en educación Primaria o Secundaria. Según los datos aportados por el Ministerio de Educación, Aragón se sitúa por encima de la media nacional (38,3%) en cuanto a la proporción de suspensos en sus aulas"* (Zaragoza, 2014).

*"España no va a tener mejores resultados educativos hasta que la mayoría de los profesores y escuelas en gran parte de las regiones afronten el bajo rendimiento educativo. La educación dentro de un contexto social puede suponer un hecho diferencial, puesto que involucra los valores que promueven el éxito educativo"* (Schleicher, 2013)

*"La Organización para la Cooperación y el Desarrollo Económico (OCDE) alerta: Los alumnos con más suspensos presentan mayor riesgo de exclusión social por no alcanzan los niveles mínimos necesarios para su correcta integración en la sociedad"* (Ministerio de Educación, Cultura y Deporte, 2014).

Estos son algunos de los últimos titulares recogidos sobre los problemas actuales en educación en España: bajo rendimiento académico, temprano abandono del sistema educativo y fracaso escolar. Más allá de conjeturas de índole político, la investigación ha remarcado la contribución de las relaciones sociales entre iguales durante la etapa escolar en la efectividad y el éxito académico (Wentzel, Donlan y Morrison, 2012), en el bienestar emocional, cognitivo y social de niños y adolescentes (Rubin, Bukowski y Laursen, 2009; Ryan y Ladd, 2012). En la presente tesis, se ha evaluado el papel de las relaciones sociales en la mejora del rendimiento académico en adolescentes. Se han contrastado las herramientas existentes para medir el grado de ajuste entre realidad y percepción de las relaciones sociales y analizado sus implicaciones en el rendimiento académico. Y por último se ha evaluado el papel de las relaciones sociales en el ajuste psicológico de los adolescentes. Antes de entrar en detalle en los aspectos académicos y de ajuste psicológico, en primer lugar, se ha realizado una breve exposición sobre las relaciones sociales haciendo especial hincapié en la medición de estas.

## LAS RELACIONES SOCIALES

Las relaciones sociales son especialmente importantes durante la adolescencia. Los grupos formados por iguales proporcionan a los individuos un contexto social en el que son capaces de aprender sobre ellos mismos, sobre otros y permiten adquirir las habilidades necesarias para el desarrollo de la competencia social. Décadas de investigación han mostrado la importancia y repercusión de las relaciones sociales entre iguales (o su carencia) para el desarrollo socio-emocional, cognitivo y comportamental en la adolescencia (Rubin et al., 2009; Ryan y Ladd, 2012).

Coincidiendo con el comienzo de la etapa adolescente, la estructura de grupo de iguales relativamente unificado, se descompone en estructuras

diferenciadas. En estas nuevas estructuras los adolescentes se pueden organizar a sí mismos por sexo (Mehta y Strough, 2009), raza y etnicidad (McDonald et al., 2013), estilo de comportamiento (e.g. agresiones, rechazo social; Haselager, Hartup, van Lieshout y Riksen-Walraven, 1998) o resultados académicos (Altermatt y Pomerantz, 2003) dando lugar a distintos tipos de relaciones y estatus sociales dentro del grupo. La investigación a nivel grupal de las relaciones sociales se ha basado en la dimensión afectiva de los tipos de interacciones entre iguales mostrando que: las relaciones sociales positivas tienen mayor probabilidad de derivar en relaciones significativas, de apoyo, seguridad y en la construcción de amistades (Bukowski, Motzoi y Meyer, 2009), o en relaciones de pareja románticas (Collins, Welsh y Furman, 2009), mientras que las relaciones sociales negativas pueden resultar en enemistad (Card, 2010) y en relaciones de acoso-víctima (Salmivally y Peets, 2009). Estar inmerso en un tipo de relaciones sociales u otro tiene implicaciones académicas, sociales y psicológicas para el adolescente (Rubin, Bukowski y Bowker, 2015). Concretamente, estar involucrado en relaciones sociales positivas ha mostrado estar asociado con un mayor nivel de bienestar emocional, comportamientos pro-sociales, mayor auto-confianza y sentimientos de inclusión e implicación en el entorno educativo (Wentzel, 2009). Por el contrario, estar involucrado en relaciones sociales negativas ha sido relacionado con acoso escolar, agresividad, problemas de autoestima, sentimientos de soledad, dificultades de atención y consumo de sustancias en adolescentes (Boivin, Hymel y Bukowski, 1995; Bukowski, Cillessen y Velasquez, 2012; Prinstein, Rancourt, Guerry y Browne, 2009).

## MEDICIÓN DE LAS RELACIONES SOCIALES

Tradicionalmente la sociometría ha sido la metodología empleada para el análisis de las relaciones sociales. Desde el clásico trabajo llevado a cabo por Moreno (1934) han sido numerosos los investigadores que han empleado la

sociometría para medir el estatus social de los miembros de un grupo (Rubin et al., 2015). En general, los métodos sociométricos miden la posición social de los individuos pertenecientes a un grupo (e.g. una clase o un equipo de trabajo) por medio de la evaluación de las relaciones positivas o negativas que se producen. Se basa en el supuesto de que cada miembro es un observador experto de las interacciones que se producen en el grupo diariamente y por lo tanto puede evaluar al grupo y a sus miembros en una variedad de características. Los métodos sociométricos son utilizados principalmente para medir la posición social de niños y adolescentes en el aula, aunque también han sido utilizados en otras estructuras grupales como equipos deportivos o en organizaciones de trabajo profesional (Arruga, 1974; López-Fe, 2002; Rodríguez y Morera, 2001).

El método habitualmente utilizado para la recogida de datos sociométricos es mediante nominaciones entre iguales. Un instrumento de uso frecuente de nominaciones consiste en un cuestionario con ítems relacionados con la aceptación o el rechazo y las percepciones de sus miembros. Cada participante debe nominar de forma ilimitada a aquellos compañeros/as según las preguntas: "¿A quién/quiénes elegirías como compañeros/as de clase?" o "¿A quién/quiénes NO elegirías como compañeros/as de clase?" así como en relación a sus percepciones "¿Quién/Quiénes crees te elegirían como compañero/a de clase?" o "¿Quién/Quiénes crees que NO te elegirían como compañero/a de clase?". Estas preguntas van acompañadas por un listado que incluye a todos los miembros del grupo. Las nominaciones son contabilizadas para cada uno de los miembros del grupo y estandarizadas en el grupo de pertenencia para controlar por el tamaño del grupo (Cillessen, 2009). Los índices sociométricos resultantes: *aceptación, rechazo, percepción de aceptación* y *percepción de rechazo*, en la presente tesis han sido

calculados siguiendo las recomendaciones de Zakriski y Coie (1996), mediante el software CIVSoc (Barrasa y Gil, 2004).

Las nominaciones entre iguales presentan ventajas sobre otros métodos de recogida de datos como auto-informados, observaciones o informados por padres. Primero, las nominaciones entre iguales poseen una alta validez de contenido ya que los informadores son aquellos quienes interactúan frecuentemente con cada uno del resto de miembros del grupo y son conocedores de la cultura del grupo. Segundo, cuando se usan nominaciones entre iguales los valores resultante de aceptación y rechazo están basados en múltiples juicios y no en el juicio de un único individuo (Bukowski et al., 2012; Marks, Babcock, Cillessen y Crick, 2013). Tercero, las puntuaciones en aceptación y rechazo mediante nominaciones entre iguales han mostrado fiabilidad y validez de la medida (Cillessen y Borch, 2006; Cillessen, Bukowski y Haselager, 2000; Jiang y Cillessen, 2005). Cuarto, son numerosos los estudios que han mostrado asociación entre aceptación y rechazo mediante nominaciones entre iguales y distintos grados de ajuste académico y psicológico (e.g., Ladd, 2005; Schwartz y Hopmeyer-Gorman, 2011).

## RELACIONES SOCIALES POSITIVAS E IMPLICACIONES ACADÉMICAS

Las relaciones sociales positivas han mostrado numerosas implicaciones durante la adolescencia. Aquellos adolescentes que puntúan alto en aceptación tienden a desarrollar mayores habilidades cognitivas y sociales que les facilitan la iniciación y formación de relaciones sociales (Gifford-Smith y Brownell, 2003). Con la vista a formas particulares de comportamiento, aquellos sujetos aceptados son vistos como cooperativos, amistosos, sociables, sensibles, atletas y buenos estudiantes por sus iguales, profesores y observadores externos (Asher y McDonald, 2009; Chen y Tse, 2008). Son numerosas las investigaciones que han encontrado una relación positiva entre

aceptación social y rendimiento académico en la infancia (Coie y Dodge, 1988; Kingery, Erdley y Marshall, 2011). Aquellos sujetos que son aceptados por el grupo muestran mejores resultados académicos en comparación con aquellos que son menos aceptados (Newcomb, Bukowski y Patee, 1993). Sin embargo, la investigación realizada durante la adolescencia, momento en que las relaciones sociales están en su punto álgido de influencia (Ryan y Ladd, 2012), ha encontrado resultados discrepantes: por un lado se ha encontrado una relación positiva entre aceptación social y rendimiento académico (e.g., Schwartz, Gorman, Nakamoto y McKay, 2006) y por otro lado se ha encontrado una carencia de relación entre aceptación social y rendimiento académico (e.g. Frenz, Gresham y Elliot, 1991).

Ante los resultados discrepantes en la investigación de la aceptación social en adolescentes Steinberg y Monahan (2007) sostienen que la influencia de las relaciones sociales durante la adolescencia no debería ser constante, debido a que la capacidad de un individuo de resistir a la influencia social se hace más fuerte a medida que se avanza en la adolescencia y se entra en la adultez (Steinberg y Monahan, 2007) y sugieren realizar investigaciones en función de la edad en la etapa de la adolescencia. Con el objetivo de conocer si la aceptación social influye de forma diferencial en el rendimiento académico de los adolescentes, analizamos el posible papel moderador de la edad en la relación entre aceptación social y rendimiento académico (estudio 1). Previamente pusimos a prueba si la aceptación social era un predictor del rendimiento académico de ese momento, durante la adolescencia. Con este estudio investigamos de forma transversal las posibles diferencias en la influencia de la aceptación social en el rendimiento académico debidas a la edad en la adolescencia.

Consistente con la premisa que las experiencias en adolescentes con sus coetáneos tendrán un efecto directo y poderoso sobre el rendimiento

académico, investigadores han mostrado una notable atención a múltiples formas de experiencias positivas entre iguales (ver para revisión: Bukowski et al., 2009). La calidad y la estabilidad de las relaciones sociales en los adolescentes está asociada con el tipo de interacciones (Bowker, 2004; Poulin y Chan, 2010). Monahan, Steinberg y Cauffman (2009) mantienen que los primeros años de adolescencia están marcados por una fuerte influencia entre los iguales que evolucionará hacia sub-grupos más establecidos en función de similitudes dando lugar a amistades dentro del grupo. La amistad es proveedora de múltiples funciones; proporciona apoyo emocional y social, ayuda instrumental, intimidad, y afecto, ofreciendo oportunidades para la sinceridad y apertura, para la validación de intereses, esperanzas, miedos y así como una base de seguridad extra-familiar (Rubin, Fredstrom y Bowker, 2008). Significativamente, sin atender a la edad o al género, la mayor parte de los adolescentes (60%-80%) tienen al menos un amigo del mismo sexo (Ellis y Zarbatany, 2007), siendo la prevalencia de amistad similar en distintas culturas (French, Purwono y Rodkin, 2012).

El desarrollo de amistades dentro del grupo puede conducir a una sensación de mayor conexión con la vida escolar y aumentar la motivación para participar en las actividades escolares, especialmente en la adolescencia (Véronneau, Vitaro, Brendgen, Dishion y Tremblay, 2010). Además, el éxito académico puede resultar contagioso entre amigos/as durante la adolescencia. Véronneau y Dishion (2011) encontraron que aquellos adolescentes que tenían amigos implicados y exitosos académicamente eran beneficiados en su éxito académico prospectivamente. Estos resultados en el estudio de las relaciones sociales positivas van en consonancia con las investigaciones previas que en conjunto destacan el papel de las amistades y de la aceptación social en el rendimiento académico de los adolescentes (Véronneau y Dishion, 2011). Con el objetivo de evaluar si la aceptación social

junto con las amistades influyen de forma diferencial en el rendimiento académico de los adolescentes, analizamos de forma longitudinal la capacidad predictiva de la aceptación social y las amistades en el futuro rendimiento académico de los adolescentes (estudio 2). Además evaluamos el posible papel moderador de la edad en las relaciones entre aceptación social y rendimiento académico, y entre amistad y rendimiento académico. Con este estudio investigamos de forma longitudinal diferentes tipos de relaciones sociales positivas que acontecen en la adolescencia (aceptación social y amistad), evaluamos sus efectos diferenciales sobre el rendimiento académico, y pusimos a prueba el posible efecto moderador de la edad en la relación entre aceptación social y amistad con rendimiento académico.

## PERCEPCIONES EN LAS RELACIONES SOCIALES POSITIVAS E IMPLICACIONES ACADÉMICAS

Debido a la importancia e implicaciones de las relaciones sociales en el desarrollo psico-social, emocional y académico de los adolescentes (Rubin et al., 2009), durante mucho tiempo la investigación sobre el desarrollo social se ha cuestionado si nos vemos a nosotros mismos como los demás nos ven. Es decir, si nuestras percepciones se corresponden con la realidad del grupo. Tomando las implicaciones académicas de las relaciones sociales positivas, si los adolescentes percibieran su estatus social de aceptación similar al que ostentan en el grupo, su percepción de aceptación podría influir beneficiosamente sobre su rendimiento académico. Sin embargo, los resultados han mostrado una falta de correspondencia entre percepciones y realidad social y por lo tanto una carente relación entre auto-percepción de aceptación y rendimiento académico (e.g. Malloy, Albright y Scarpi, 2007). Las consecuencias de una falta de correspondencia entre auto-percepción de aceptación y aceptación social en la adolescencia están relacionadas con el

desarrollo de conductas agresivas (David y Kistner, 2000; White y Kistner, 2011; Stephens, Kistner y Lynch, 2015) y síntomas depresivos (Campbell y Fehr, 1990; Stephens et al., 2015). Teniendo en cuenta estas asociaciones, la investigación sobre las implicaciones y mecanismos subyacentes a una falta de correspondencia entre auto-percepción de aceptación y aceptación social en la adolescencia es necesaria para identificar a aquellos adolescentes que pueden estar en riesgo de tener resultados socio-académicos adversos (Preckel, Niepel, Schneider y Brunner, 2013). Con el objetivo de esclarecer las implicaciones académicas de una falta de correspondencia entre auto-percepción de aceptación y aceptación social en la adolescencia (estudio 3), en primer lugar se han investigado de forma longitudinal las relaciones entre percepción de aceptación, aceptación social, las distintas medidas del grado de correspondencia entre percepción-realidad existentes y rendimiento académico. Teniendo en cuenta las consideraciones de la investigación llevada a cabo por Preckel et al. (2013), en la que proponen un mecanismo mediador en la relación entre auto-percepción y aspectos académicos, se ha propuesto un modelo de mediación en el que el grado de correspondencia entre auto-percepción y realidad social subyace a la relación entre auto-percepción de aceptación y rendimiento académico. Dadas las múltiples formas existentes de medir el grado de correspondencia entre auto-percepción y realidad social, se ha evaluado la consistencia y estabilidad de las distintas medidas transversal y longitudinalmente en el modelo de mediación propuesto. Con este estudio investigamos de forma longitudinal un posible mecanismo subyacente a la relación entre auto-percepción y rendimiento académico, y evaluamos y contrastamos las distintas medidas existentes del grado de correspondencia entre auto percepción y realidad social, así como sus implicaciones en el rendimiento académico.

## RELACIONES SOCIALES NEGATIVAS E IMPLICACIONES PSICOLÓGICAS

Las relaciones sociales han mostrado ser la principal fuente de soledad en los adolescentes (Asher y Paquette, 2003; Heinrich y Gullone, 2006; Qualter et al., 2015). Concretamente, las relaciones sociales positivas han mostrado tener un efecto amortiguador en la aparición de la soledad (Buhs y Ladd, 2001; Mouratidis y Sideritis, 2009; Woodhouse, Dykas y Cassidy, 2011) y por el contrario las relaciones sociales negativas han mostrado estar positivamente relacionadas con la soledad (Betts y Stiller, 2014; Crick y Ladd, 1993; Pedersen, Vitaro, Barker y Borge, 2007). La soledad puede venir determinada por una carencia o dificultad en las relaciones y una necesidad insatisfecha de relaciones sociales. Asher y Paquette (2003) señalaron: "Es posible ser aceptado en el grupo y/o tener muchos amigos y sentirse solo. Así mismo, también es posible ser poco aceptado por el grupo y/o tener pocos amigos y no sentirse solo". Una pequeña red social puede satisfacer la necesidad social de un individuo, o por el contrario una gran red social puede no satisfacer la necesidad social de un individuo. Desde la teoría de la autodeterminación (Deci y Ryan, 1985) la soledad ocurre cuando, concretamente la necesidad de relaciones de un individuo no es satisfecha. Recientemente, desde una perspectiva integradora, Martín-Albo et al. (2015) encontraron que junto a la necesidad de relaciones, la regulación emocional de los sujetos jugaba un papel determinante en la aparición y mantenimiento de la soledad en adolescentes. Con un objetivo exploratorio e integrador, nos planteamos cómo las relaciones sociales (aceptación y rechazo), la necesidad de relaciones y la regulación emocional influyen en la soledad (estudio 4). En base a las evidencias mostradas, evaluamos longitudinalmente la influencia simultánea de aceptación y rechazo, necesidad de relaciones sociales y regulación emocional sobre la soledad en adolescentes. Además pusimos a prueba el

papel de la soledad como variable dependiente frente a variable dependiente. Con este estudio investigamos de forma longitudinal las relaciones sociales medidas objetivamente, las necesidades individuales y la regulación emocional en la soledad de los adolescentes.

En conjunto, los estudios de la presente tesis han utilizado metodología cuantitativa en el estudio de las relaciones sociales y sus implicaciones académicas y psicológicas en la adolescencia de forma transversal y longitudinal.

# ESTUDIO 1

Analysis of the changing relationship between peer acceptance and academic achievement in adolescents.

## ABSTRACT

Peer interactions in the context of group-level relationships have significant consequences on social adjustment across the lifespan of children and adolescents. Indeed, peer relations change systematically as individuals' development. This study examined the effect of positive peer interactions measured as peer acceptance on academic achievement during adolescence developmental stage. Participants were 766 students aged 11 to 16 years old. Adolescents completed a sociometric measure of peer acceptance. Academic achievement data were obtained from students' report-card grades. Regression analyses indicated that peer acceptance predicted academic achievement positively and also a moderation effect was found displaying a higher impact of peer acceptance on academic achievement for younger adolescents than for older adolescents. It is suggested that improving peer relationships within the group, especially at early adolescence, can be a target of intervention to improve academic functioning at school.

Peers are of central importance to children throughout childhood and adolescence. They provide companionship, affection, intimacy, instrumental aid, enhancement of self-worth, personal validation and emotional support, and are a foundation for identity development (Furmann & Buhrmester, 1992). In turn, social interactions among peers (and the lack thereof) have significant short- and long-term consequences on social, emotional, and cognitive well-being and on adjustment across the lifespan (Rubin, Bukowski, & Laursen, 2009).

The nature of the peer interactions in the context of group-level relationships determines peer status within the group (Meijs & Cillessen, 2010). Peer status is a measure of an individual's social functioning that is determined by his or her group as a whole, and is typically measured through sociometric methods. A sociometric test measures relationships in groups and group structure by asking all group members to evaluate each other, either as "like most" rating, or on other sociometric criteria, using peer nominations, peer ratings, or a similar method (see Cillessen, 2009, for a description of all the elements of a variety of sociometric procedures). Further, the extent to which one is actively liked, accepted, or preferred by one's peers indicates peer acceptance status. Some of the key behaviors associated with those who enjoy acceptance status group include prosocial behaviors, being generally helpful to their peers, positive school attitudes, being cooperative and socially skilled (for a review, see Gifford-Smith & Brownell, 2003).

Adolescents who engage in positive interactions with peers tend to have stronger and more adaptive levels of emotional well-being, self-beliefs, values of prosocial forms of behavior, social interaction, a sense of inclusion and engagement at school than do adolescents without positive peer relationships (Wentzel, 2009). In this regard, positive relationships have the potential to

provide the added incentives of engagement, motivation, and interpersonal resources, such as emotional support or instrumental help, to deal with competent academic functioning (Wentzel, Donlan, & Morrison, 2012).

Therefore, the degree to which adolescents enjoy positive interactions with peers is especially important to understand their adaptation and ultimate achievement in school (Ladd, 1990). In this sense, research has investigated different processes as social modelling, expectancy socialization, informational support, and emotional support provided by peers. Results positioned all of them as important social mechanisms of influence on one's academic results (Altermatt, 2012). Concretely, accepted individuals experience more opportunities to learn adaptive modes of social behaviours, social cognitions, and emotional support that dispose them toward better academic results. Differently low-accepted individuals are less likely to have a positive social or academic reputation established in the peer group that in turn, cause them to be ignored, ridiculed, and consequently have less opportunity to experience interactions with peers (Parker & Asher, 1987). Positive peer relationships contribute essentially to the socialization of social competence, academic reputation, and to the ability to succeed socially and academically (Altermatt, 2012). These processes underline the influence of peer interactions on one's academic adjustment. Typically, research has centred on academic achievement as an objective academic adjustment measure (Spinath, 2012).

One of the first studies relating positive peer interactions to academic achievement by sociometric methods was carried out by Austin and Draper (1984) with a sample of 8- to 11-year olds. It was found that acceptance correlated positively and significantly with academic achievement. In the same direction, with a younger sample aged between 6 and 8 years, Coie and Dodge (1988) found an association between peer acceptance and academic

achievement using sociometric assessment and also peers' and teachers' reports.

Newcomb, Bukowski, and Pattee (1993) carried out a meta-analytic review of peer status measured by sociometric methods. It indicated that children in each peer status had distinct behavioral repertories that shaped and influenced their peer interactions and outcomes and, therefore, their peer relationships. In particular, the authors found that peer-accepted children showed higher levels of sociability and cognitive abilities than other peer statuses, using samples aged between 4 and 10 years. The relationship of peer acceptance and academic achievement was reinforced in the study.

Research has also focused on the causal direction of the association between peer acceptance and academic achievement. Wentzel and Caldwell (1997), with a sample aged 11 to 13 years, found that peer acceptance was a significant predictor of academic achievement both concurrently and over time, therefore indicating the causal effect of peer acceptance, measured by sociometric assessment, on academic achievement.

Regarding the transition from elementary school to middle school, early adolescents are likely to experience adjustment difficulties due to the rising importance of peer relationships, as they spend more time with their peers (Steinberg, 2008). Kingery, Erdley, and Marshall (2011) reported that pretransition peer acceptance contributed significantly to the prediction of posttransition academic achievement, indicating that adolescents' pretransition social interactions play a key role in their academic success following the transition. In addition, the status of children not accepted by their peers preceded lower academic achievement from elementary to middle school (Bellmore, 2011).

As compared to research in childhood, few studies have used sociometric assessment to examine peer status and academic outcomes in adolescence (Prinstein, 2007). Nevertheless, adolescence is a developmental stage characterized by peer experience, and the increasing importance of peer interactions may place adolescents at risk for a broad range of behavior problems and disorders, such as delinquency, drug and alcohol use, depression and anxiety (Steinberg, 2008). In this regard, the empirical evidence of previous findings with adolescent samples has varied. On the one hand, the result of a longitudinal study with a sample of 14–15-year-olds carried out by Schwartz, Gorman, Nakamoto, and McKay (2006) showed the stability of the relationship between peer acceptance and academic achievement. On the other hand, and in the opposite direction, Frenz, Gresham, and Elliott (1991) found no relationship between peer status and academic achievement in a sample of adolescents aged 12 to 16 years. Therefore, a closer examination of the role of peer acceptance in adolescents' academic achievement may have important implications for intervention and development programs prior to risk situations.

Peer relations change systematically as individuals development (Gifford-Smith & Brownell, 2003), but there is a lack of research on the role of age in the effect of peer status on academic achievement. Whether or not positive peer relationships play a different role in academic achievement across adolescence is not yet documented. The aim of the present study is to investigate the relation between peer acceptance and academic achievement throughout adolescence. Based on the previous findings reviewed, we hypothesized that: 1) peer acceptance ratings will predict academic achievement positively in adolescence; 2) the relation between peer acceptance and academic achievement will be different depending on age during adolescence. Concretely, we expected that the effect of peer acceptance on academic

achievement will be moderated by age, being higher at younger than at older adolescents.

# METHOD

## PARTICIPANTS

A total of 858 adolescents from 5 public high schools located in the northeast of Spain were recruited. In all, 37 classrooms from 1st grade through 4thgrade (equivalent to 7th–10th grade in the USA) participated in the study. A completion rate of 89.27% was obtained (*N* = 766) for the peer nomination instrument. Of the participants, 50% were females, and mean age was 13.73 years (*SD* = 1.42). Regarding age, the sample was distributed as follows: 25.2% were 12 years old, 22.6% were 13, 18.8% were 14, 23.0% were 15, and 10.4% were 16 years old.

## MEASURES

**Sociometric measure**. The sociometric question we asked the students was: "Who/se do you like the most?" The index was calculated using the CIVSoc (Barrasa & Gil, 2004), a computer program for the calculation and sociometric representation of values and indexes. The peer acceptance measure was the number of acceptances received by an adolescent divided by the number of students in class minus one. This is a student's ranking of acceptance by the class. The value ranges from 0 (minimum) to 1 (maximum).

Marks, Babcock, Cillessen, and Crick (2013) considered a participation rate of 50% to be reliable for sociometric assessment of peer acceptance with unlimited nominations. Thus, the participation rate in the present study (89.27%) was considered high enough to yield reliable sociometric data.

**Academic achievement**. Academic achievement was measured with the students' report-card grades issued by the secretariat of the high school. Only compulsory subjects were used to calculate the mean of the academic achievement index, because interactions among same-graders from different classes during regular classes only can occur in some non-compulsory subjects. Grades are on a continuous scale ranging from 0 to 10, with 10 indicating a perfect score and grades of less than 5 indicate failure to pass the subject.

## PROCEDURE

Data collection for the cross-sectional design was carried out by a team of researchers during the spring semester in the students' classrooms at school, during regular classes. To ensure there was no bias due to reading difficulties, a member of the research team read and explained each item aloud, while at least two associates remained in the room to monitor students' progress and answer any questions. To obtain nominations for the sociometric assessment, a list with the names of their classmates was presented on the blackboard. As interactions among same-graders from different classrooms are not habitual during regular classes in the Spanish school system, the students in each classroom knew each other well, so the classroom was the reference group. Nominations were unlimited. The adolescents could choose as many or as few classmates as they wished, including same- and other-gender peers, but not themselves. Before completing the sociometric and socio-demographic measures by computer, we explained to the students that all of their answers were confidential and they did not have to answer any question if they did not want to. Participation in the study required both parental consent and individual assent.

### STATISTICAL ANALYSIS

As preliminary analyses, firstly, we present an overview of the measures, including the means, standard deviations and bivariate correlations among the variables of the study. Hierarchical multiple regression analysis was conducted to examine the degree to which children's academic achievement could be predicted from peer acceptance, age, and Age × Peer acceptance interaction. At Step 1, only gender (dummy coded: female = 1, male = 0) was entered in the equation as a covariate because, although gender was not a focus of this investigation, previous research has consistently reported higher academic achievement for female adolescents than for males (Schwartz et al., 2006; Wentzel, 2003). Therefore, gender was added to the model as a covariate. At Step 2, peer acceptance and age were introduced as the set of focal predictors. At Step 3, the interaction term Age × Peer acceptance was entered. We expected a negative sign for the interaction term, which could explain the above-mentioned discrepancy in the relationship between peer acceptance and academic achievement found in adolescent samples. The significant interaction was subsequently analysed in more detail by conducting simple slopes analyses at values of one standard deviation above (high) and below (low) the means of the predictors (Cohen, Cohen, West, & Aiken, 2003).

## RESULTS

Table 1 presents the preliminary analyses. Academic achievement was related positively with peer acceptance and negatively with age. Peer acceptance was positively related to gender. There was not significant relation between peer acceptance and age. Gender was significantly and positively related to academic achievement. It was not related with age.

Table 1

*Descriptive Statistics and Bivariate Correlations among the Variables of the Study*

| Variables | *M* | *SD* | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| 1. Academic achievement | 5.90 | 1.47 | - | .28* | –.21* | .14* |
| 2. Peer acceptance | .30 | .16 | | - | –.03 | .10* |
| 3. Age | 13.73 | 1.42 | | | - | .03 |
| 4. Gender | - | - | | | | - |

*$p < .01$.

To assess the significance and the effect of peer acceptance and age on academic achievement while controlling for the covariate, gender, in adolescents, a hierarchical multiple regression analysis was run. As shown in Table 2, the regression models were significant, predicting a total of 14% of the variance of academic achievement. In Step 1, gender (dummy coded: female = 1, male = 0) was entered. Results indicated that female students scored significantly higher in academic achievement than did male students ($M$ = 5.70 and 5.29, for females and males, respectively; $t$ = 3.84, $p$ < .001). In Step 2, peer acceptance and age were introduced. Results of this model predicted a total of 11% of the variance of academic achievement. In Step 3, the interaction term Age × Peer acceptance was entered. As expected, in the final model the interaction term was negative and statistically significant ($p$ = .009). This indicates that increments in the students' age reduced the slope that relates peer acceptance with academic achievement. In other words, changes in peer acceptance have a higher impact in the predicted academic achievement for younger adolescents than for older adolescents. Although this, the increment in the percentage of explained variance due to the interaction term was rather small, {$R^2$ = .01. In order to understand this effect, academic achievement by

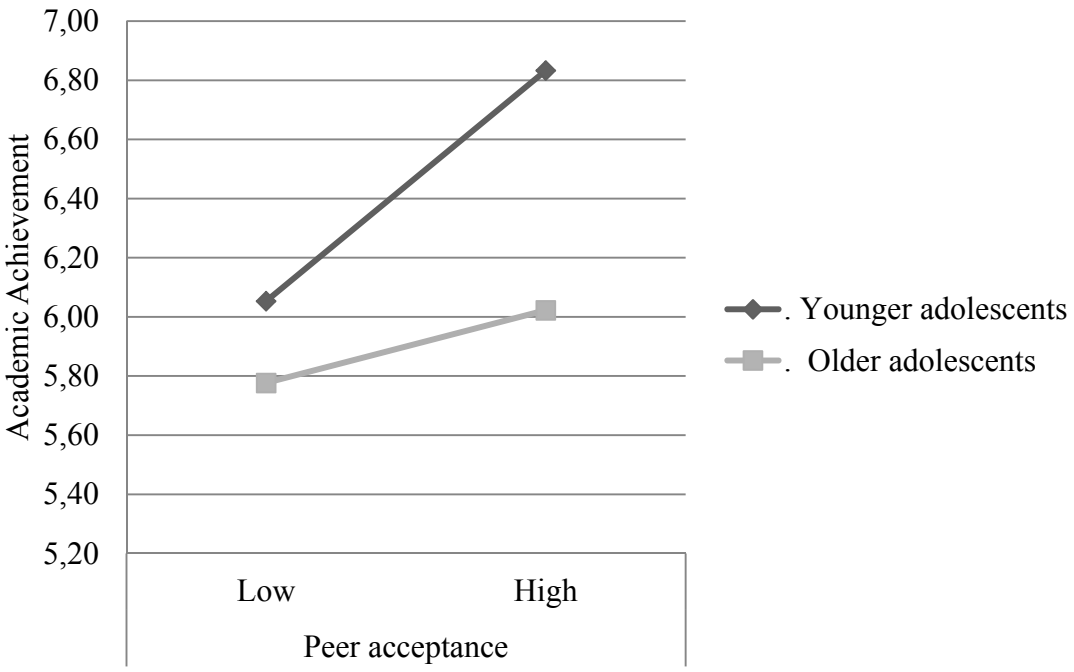
Age × Peer acceptance interaction was plotted separately (see Figure 1), following the procedures of Cohen et al. (2003).

Table 2

*Hierarchical Multiple Regression Analysis Predicting Academic Achievement from Peer Acceptance and Age*

| Predictor | $\Delta R^2$ | *b* | *SE* | β | *p* |
|---|---|---|---|---|---|
| Step 1 | .02 | | | | < .001 |
| Intercept | | 5.29 | .17 | | < .001 |
| Gender | | .41 | .11 | .14 | < .001 |
| Step 2 | .11 | | | | < .001 |
| Intercept | | 7.54 | .51 | | < .001 |
| Gender | | .35 | .10 | .12 | < .001 |
| Age | | –.21 | .04 | –.20 | < .001 |
| Peer acceptance | | 2.45 | .32 | .26 | < .001 |
| Step 3 | .01 | | | | .009 |
| Intercept | | 4.99 | 1.1 | | < .001 |
| Gender | | .35 | .10 | .12 | .001 |
| Age | | –.03 | .08 | –.03 | .719 |
| Peer acceptance | | 11.00 | 3.28 | 1.16 | .001 |
| Age × Peer acceptance | | –.62 | .24 | –.92 | .009 |
| Total $R^2$ | .14 | | | | |

*Figure 1.* Interaction between peer acceptance and age in the prediction of academic achievement.




*Note*. Academic achievement is a continuous variable ranging from 0 to 10; grades below 5 indicate the subject has been failed, and grades of 10 indicate a perfect score.

## DISCUSSION

The present study examined the relationship of peer acceptance on academic achievement during adolescence and the role of age in this relationship. Firstly, we expected to find peer acceptance to be a predictor of academic achievement during adolescence. Results showed that peer acceptance contributed significantly to the prediction of academic achievement, supporting our first hypothesis. This is consistent with the results reported in empirical literature on the correlates and consequences of adolescents' peer relationships, which has found a relation between peer acceptance and

students' academic progress (Lubers, Van Der Werf, Snijders, Creemers, & Kuyper, 2006). On the other hand, it also coincides with results finding that peer rejection is associated with school-related difficulties, such as poor academic achievement (Véronneau, Vitaro, Brendgen, Dishion, & Tremblay, 2010). Several mechanisms could account for the capacity of peer acceptance to predict academic achievement. Students who are accepted by their peers receive emotional support that facilitates engagement in class they have a greater sense of belonging in school and many opportunities to practice the necessary social skills for success in the classroom (Wentzel, 2009). Zettergren (2003) suggested that the association between peer acceptance and academic achievement may be due to cognitive skills. This author found that the academic achievement and intelligence level of peer-accepted children were higher than the standards of children from other peer statuses.

In accordance with the second hypothesis, we found that during adolescence the effect of peer acceptance on academic achievement was moderated by age. It implies that changes in peer acceptance scores have a higher impact in the predicted academic achievement for younger adolescents than for older adolescents. A decrease in acceptance scores has a negative higher repercussion on one's academic achievement for younger adolescents than for older. As adolescents get older the influence of the peer group in the relation between peer acceptance scores and academic achievement decrease, may be due to a shift in the importance given to the peer group. Phillipsen (1999) pointed out that throughout adolescent years romantic relationships begin to gain importance relative to friendships; interactions with adults decrease, and interactions with cross-sex peers may increase. Thus, a derived explanation suggests a focus change in social relations that may rest relative importance to the peer group in favour of romantic relationships, interactions with cross-sex peers or small network groups.

The cross-sectional design of the study limits the generalization of the results. Although the analyses conducted in this study are robust and we used a wide sample of adolescents, we assessed variables at a single point thus, infer causality is not allowed. Longitudinal analyses should be carried out to evaluate the stability of the effects of peer acceptance on academic achievement throughout adolescence. This would also increase the strength of the conclusions reached.

## IMPLICATIONS

The present study yields new insights in the importance assigned to peer interactions in the consecution of academic adjustment in adolescents. First, we note the influence of peer acceptance on academic achievement during adolescence. And second, we note the role of age in the modification of the relationship between peer acceptance and academic achievement. Our results suggest that improving peer relations among the class group may imply an improvement of adolescents' academic achievement. To our knowledge, specific interventions on peer acceptance have not yet been carried out in adolescents. However, effective intervention programs to promote social-emotional development and enhance positive peer relations in the preschool years (Bierman & Motamedi, 2015; Bierman et al., 2014) have a common consideration: who can count on support to change or improve their social standing will be able to cope with the stressors present in the school settings and maximize their opportunities for academic achievement. In light of our results, and focusing on adolescents samples, seems particularly important to focus intervention efforts on younger adolescents with low peer acceptance in order to increase their social support network within the class peer group. Further research is warranted in order to design properly intervention programs in adolescents.

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# ESTUDIO 2

## Relations among peer acceptance, friendships, and academic achievement across adolescence: the moderating effect of age.

## ABSTRACT

The present study explored peer acceptance and friendships during adolescence, and on their relation with subsequent changes in adolescents' academic achievement. Participants were 447 students (51.0% female) aged 11 to 16 years old. Adolescents completed sociometric assessments of peer acceptance and friendships during the autumn semester (Time1). Academic achievement data were also obtained from students' report-card grades at Time 1 as well as during the spring semester (Time 2) of the same academic year. Regression analysis indicated that peer acceptance positively predicted subsequent academic achievement. This relationship was also found to be moderated by age with the effect of peer acceptance on subsequent academic achievement being higher at early adolescence than at middle adolescence. This research deepens the understanding of the mechanism by which positive peer relationships influence in a different manner adolescents' academic achievement.

Peers and friends are particularly important during childhood, adolescence and young adulthood. They provide companionship, affection, intimacy, instrumental aid, enhancement of self-worth, personal validation and emotional support, and are a foundation for identity development (Furmann & Buhrmester, 1992). In turn, social interactions among peers have significant short- and long-term consequences on psychological and social adjustment across the lifespan (Rubin, Bukowski, & Laursen, 2009).

However the relative influence of different peer relationships may change across development. As the subject goes through adolescence, the social interest changes from the family to the peer group (Larson & Richard, 1991). As compared to adolescents who lack positive peer relationships, those who do engage in positive relationships tend to have stronger and more adaptive levels of emotional well-being, self-beliefs, values of prosocial behaviours, social interaction, and a sense of inclusion and engagement at school (Wentzel, 2009). Some of the key behaviours shown in these positive interactions are prosocial behaviours, being generally helpful to their peers, positive school attitudes, being cooperative, and socially skilled (Gifford-Smith & Brownell, 2003).

Decades of research seem to suggest that peer acceptance—the extent to which one is actively liked, accepted, or preferred by one's peers—emerges as a core indicator for academic success as well as for social and emotional well-being, and adjustment during the adolescence (DeRosier & Lloyd, 2011). Particularly, researchers have noted that being accepted and having friends at school emerges as an important aspect for positive growth in school. Peer acceptance and friendships in the school settings contribute to the feelings of belongingness to school and school liking, which are key to academic motivation and success (Boulton, Don, & Boulton, 2011; Kingery, Erdley, & Marshall, 2011). In fact, peer

acceptance has been identified as an important marker of successful development which is positively related to social well-being and academic achievement both concurrently and over time (Wentzel & Caldwell, 1997).

Peer acceptance and friendships have been expounded as key roles for academic achievement as this leads to a feeling of higher connection to school life and extend motivation to get involved in curricular and extracurricular school activities, especially in adolescence (Véronneau, Vitaro, Brendgen, Dishion, & Tremblay, 2010). Likewise has been proposed that adolescents can even be benefited in their academic success from being part of a peer group of academically engaged friends (Véronneau, & Dishion, 2011). These findings align with the previous research which suggested that friendships and peer acceptance in school play an important role in academic achievement (Véronneau, & Dishion, 2011).

Overall, research has indicated that the social aspect of individuals' academic achievement cannot be ignored, especially during adolescence. The degree to which adolescents are accepted and have friends at school might be especially important for understanding their adjustment to, and achievement at, school. In this sense, research has centered on academic achievement as a school outcome—considered a prerequisite for personal and societal development—which uses school marks as selection criteria for jobs and higher education (Spinath, 2012). Wentzel (1991) points out that school grades indicate the subject's learning within the classroom as a social context. While standardized tests and performance evaluate capacities and skills specifically and punctually without any social influence, the global academic accomplishment of a student, academic achievement, requires discipline and struggle during a long period time (Voyer & Voyer, 2014). Both theory and research have indicated that friendships and peer acceptance constitute an especially substantial dimension of social functioning given the strong focus on the peer group during

adolescence, and consequently need to be considered when examining academic outcomes (Eccles & Roeser, 2010).

Despite the importance showed by research on peer relationships and its relation with academic achievement in adolescence, studies have not considered whether this relation may vary across different developmental stages of adolescence. Adolescence is also a developmental period characterized by many adjustments, including in a social dimension. It is essential to become an accepted member of the social group and being successful at school at the same time to be assertive in the fulfilment of the journey which is adolescence (Witkow & Fuligni, 2010). A particularly meaningful period to study peer relationships is early adolescence, when these relationships are at the height of importance for youngsters themselves. Afterwards, romantic relationships begin to gain importance relative to friendships; interactions with adults decrease, and interactions with cross-sex peers increase (Phillipsen, 1999).

Based on previous theoretical considerations and research findings, the aim of the present study is to explore positive peer relationships measured as peer acceptance and friendships, and their relation with academic achievement during different stages of the adolescence developmental period. It was hypothesized that peer acceptance and friendships positively predict subsequent academic achievement across the early- to mid-adolescence periods. Besides considering the social shift during adolescence toward peers, we suggest that the relationship between peer acceptance, friendships and academic achievement might be different throughout adolescence by which we propose that this relationship will be moderated by age.

# METHOD

## PARTICIPANTS

A total of 447 adolescents from five public high schools located in the northeast of Spain participated in the study. In all, 37 classrooms from 1st grade through 4thgrade (equivalent to 7st-10th grade in the USA) were recruited. Of the participants, 228 were females (51%), and the mean age was 14.07 years (*SD* = 1.23).

## MEASURES

**Peer acceptance**. Students were given a list with the names of their classmates to respond to the question "Who do you like the most?" The adolescents could choose as many or as few classmates as they wished, including same- and other-gender peers, but not themselves. The class was the reference group due to the fact that in the Spanish school system interactions among same-graders from different classrooms are not feasible during regular classes. This is why the students in each classroom knew each other well. An adolescent's peer acceptance score was calculated using the CIVSoc (Barrasa & Gil, 2004). The program procedure used was the number of acceptances received divided by the number of students in class minus one. The value ranges from 0 (minimum) to 1 (maximum).

**Friendships.** To calculate the number of friends each participant had in the classroom, we looked at reciprocal nominations among students. These raw scores were divided by the number of students in the class minus one. The value ranges from 0 (minimum) to 1 (maximum).

**Academic achievement**. Academic achievement was measured with the students' report-card grades issued by the high school at Time 1 (at the end of

the autumn trimester) and at Time 2 (at the end of the spring trimester). Grades are on a continuous scale ranging from 0 to 10, with 10 indicating a perfect score and grades of less than 5 indicating failure to pass the subject. This measure had adequate test-retest reliability from Time 1 to Time 2 ($r$ = .88, $p$ < .01).

### PROCEDURE

Data collection was carried out at school during regular class time. Time 1 data, involving all variables, were collected between November and December. The measure of academic achievement Time 2 was collected approximately 6 months later between May and June of the same academic year. To ensure there was no bias due to reading difficulties, a member of the research team read and explained each item aloud, while at least two assistants remained in the room to monitor students' progress and answer any questions. Before completing the sociometric and demographic measures by computer, we explained to the students that all of their answers were confidential and they did not have to answer any question if they did not want to. Participation in the study required both parental consent and individual assent.

### STATISTICAL ANALYSIS

As preliminary analyses, firstly, we present an overview of the variables, including the means and standard deviations. As age has been treated as a continuous variable denoting one standard deviation below the mean early-adolescents, and one standard deviation above the mean middle adolescents, the descriptive analyses of the sample has been split for early-adolescence, mid-adolescence, and the total sample.

Next, independent sample *t-tests* were conducted to explore whether early and middle adolescents differed in academic achievement at Time 1 and Time 2,

peer acceptance, or friendships. Independent sample *t-tests* by gender (dummy coded: female = 1, male = 0) were also calculated among the variables of the study. Subsequent bivariate correlations among peer acceptance, friendships and academic achievement at Time 1 and at Time 2 were calculated. A regression analysis was conducted to examine the degree to which children's academic achievement Time 2 could be predicted from peer acceptance and friendships, while taking into account academic achievement Time 1 and gender. Also to test whether age moderates the effect of peer acceptance and friendships (independent variables) on subsequent academic achievement, we included these two interactions in the analysis. Age was used as continuous variable. In order to understand these effects, significant interactions were analyzed in more detail and plotted separately by conducting simple slope analyses at values of one standard deviation above (high) and below (low) the means of the predictors (Cohen, Cohen, West, & Aiken, 2003).

## RESULTS

Descriptive statistics for peer acceptance, friendships and academic achievement at Time 1and Time 2 are presented in Table 1. Independent sample *t-test* were also conducted to explore whether early adolescence and middle adolescence participants differed in peer acceptance, friendships and academic achievement. The results showed that early adolescents endorsed higher levels of academic achievement at Time 1 $t(445) = 2.05$, $p = .04$, but were equal with middle adolescents in academic achievement at Time 2 $t(445) = 1.17$, $p = .24$. The results also showed that with respect to the class level, middle adolescents had more friendships, $t(445) = -2.39$, $p = .02$, and higher peer acceptance $t(445) = -2.20$, $p = .03$ than early adolescents.

Table 1

*Descriptive Statistics of peer acceptance, friendships, and academic achievement Time 1 and Time 2 of early adolescence, middle adolescence, and the total sample.*

| | Early-Adolescence (n = 137) | | Mid-Adolescence (n = 308) | | Total (*N* = 445) | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Peer acceptance | .17 | .11 | .20 | .13 | .19 | .13 |
| Friendships | .05 | .07 | .08 | .09 | .07 | .09 |
| Academic achievement T1 | 5.72 | 1.56 | 5.39 | 1.47 | 5.49 | 1.51 |
| Academic achievement T2 | 5.85 | 1.73 | 5.65 | 1.66 | 5.71 | 1.68 |

To examine whether boys and girls differed in peer acceptance, friendships and academic achievement at Time 1 and Time 2, independent sample t-test were conducted. The results showed that girls endorsed higher levels of academic achievement at Time 1 $t(447) = -3.14$, $p < .01$, and academic achievement at Time 2 $t(447) = -3.15$, $p < .01$ than boys. The results also showed that with respect to peer relationships, boys and girls did not differ in friendships, $t(447) = -3.49$, $p = .69$, or in peer acceptance $t(447) = -1.64$, $p = .10$.

The following correlation analyses (see Table 2), revealed a positive relation between academic achievement variables and peer relationship variables. Academic achievement Time 1 was positively related to peer acceptance ($r = .28$, $p < .001$) and friendships ($r = .25$, $p < .001$). And indeed, academic achievement Time 2 was positively related to peer acceptance ($r = .24$, $p < .001$) and friendships ($r = .23$, $p < .001$).

Table 2

*Correlations among all variables with the total sample.*

| Variables | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Academic achievement T1 | - | .88*** | .28*** | .25*** | -.15** | .15** |
| 2. Academic achievement T2 | | - | .24*** | .23*** | -.12** | .15** |
| 3. Peer acceptance | | | - | .56*** | .10* | .07 |
| 4. Friendships | | | | - | .15** | .01 |
| 5. Age | | | | | - | -.12* |
| 6. Gender | | | | | | - |

* $p < .05$; ** $p < .01$; *** $p < .001$.

A regression analysis was conducted to determine the extent to which peer acceptance, friendships and gender predict students' subsequent academic achievement. Also to test whether age moderated the effect of peer acceptance and friendships (independent variables) on subsequent academic achievement these two interaction terms were included in the analysis. Table 3 presents these results. The overall model for the prediction of academic achievement at Time 2 was significant, $F(7,437) = 4.33$, $p = .01$, $R^2 = .79$. As can be seen in Table 3, previous academic achievement, peer acceptance and age predicted subsequent academic achievement. Only the interaction term Age × Peer acceptance was significant. In order to understand this effect, a simple slope analysis was conducted and plotted separately (see Figure 1) following the procedures of Cohen et al. (2003). This indicates that increments in the students' age reduced the slope that relates peer acceptance with academic achievement. In other words, changes in peer acceptance have a

higher impact in the predicted subsequent academic achievement for early adolescence than for middle adolescence students.

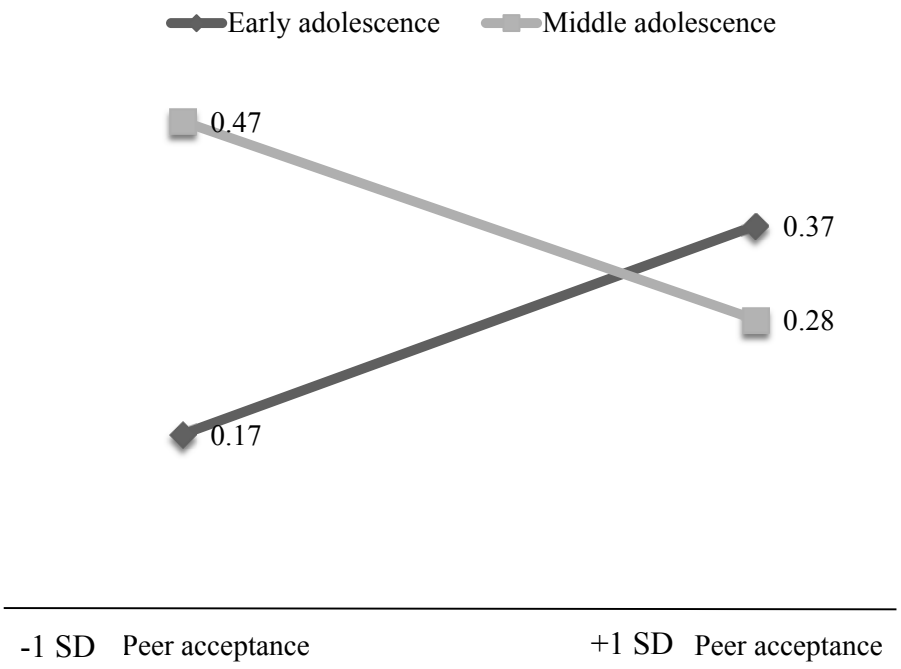
Table 3

*Regression analysis predicting subsequent academic achievement Time 2 from academic achievement Time 1, peer acceptance, friendships, age and gender.*

| Predictors | *b* | *SE* | β |
|---|---|---|---|
| Intercept | -1.94 | .83 | |
| Gender | .05 | .08 | .02 |
| Age | .16 | .06 | .11** |
| Academic achievement T1 | .98 | .03 | .88** |
| Peer acceptance | 8.75 | 4.19 | .66* |
| Friendships | 3.27 | 6.29 | .17 |
| Age × Peer acceptance | -.62 | .29 | -.69* |
| Age × Friendships | -.19 | .43 | -.15 |
| Total $R^2$ | .79 | | |

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

*Figure 1.* Interaction between peer acceptance and age predicting subsequent academic achievement throughout adolescence.




## DISCUSSION

This investigation furthers our understanding of what is known about the prediction of positive peer relationships for academic achievement during different stages of the adolescence developmental period. First, we examined age-related differences in peer relationships; specifically peer acceptance and friendships, and academic achievement across early- to mid-adolescence, as well as gender differences. Second, we examined the effects of peer acceptance and friendships on subsequent academic achievement and whether these effects are moderated by age, after controlling for concurrent academic achievement. Our findings are consistent with a conclusion that positive peer relationships serve varied functions during early and middle adolescence in academic achievement.

Our investigation into age-related differences during adolescence provided varied results. Related to concurrent academic achievement, early adolescents got higher academic achievement than middle adolescents. Unexpectedly, in subsequent academic achievement there were no differences between the early and mid- adolescence periods. In regard to peer relationships, early and mid-adolescents showed differences. Past research and theory have suggested that with the beginning of the adolescent period, the importance of being accepted in the social group is magnified (Wigfield, Byrnes, & Eccles, 2006). This is in line with our results which indicated that middle adolescents reported more peer relationships, specifically peer acceptance and friendships, than early adolescents. What seems to indicate that the focus toward the peer group increases throughout adolescence developmental period.

The present study also tested for gender differences in peer relationships and academic achievement. Our results were in accordance with previous findings in adolescence samples (Huang & Su, 2014; Lubbers, Van Der Werf, Snijders, Creemers, & Kuyper, 2006) which reported a decrease in gender-segregation during secondary school, and furthermore, no gender differences in peer acceptance or friendships were found in the present study. However, regarding academic achievement, girls scored higher than boys at both times. It is consistent with a meta-analysis by Voyer and Voyer, (2014) which indicated a small but significant and stable female advantage in academic achievement. It may be due to the fact that compared to adolescent girls, boys placed less importance on academic success (Berndt & Miller, 1990), and dropped out of school in higher percentages than girls (Zettergren, 2003). Although, also other variables that have not been taken into account may influence over performance of girls, as individualistic vs. collectivist cultures.

Beyond these differences, our correlational analysis indicated that peer acceptance and friendships were positively related to academic achievement

both concurrently and over time. These correlations are in concordance with the literature in significance and orientation showing that positive peer relationships and good academic achievement tend to co-occur as well as being related over time (Oberle & Shonert-Reichl, 2013).

The present study provides clear support for the link of positive peer relationships and academic achievement. In particular, peer acceptance added significantly to the prediction of the subsequent academic achievement beyond the prediction due to current academic achievement. Generally, peer acceptance is recognized as indicator of a propitious progress in relation to both social well-being and academic achievement (Wentzel, 1991; Wentzel & Caldwell, 1997). Furthermore, it also coincides with previous findings which related peer problems to school difficulties, such as poor academic achievement (Véronneau, Vitaro, Brendgen, Dishion, & Tremblay, 2010).

In addition, our finding showed that throughout adolescence the effect of peer acceptance on academic achievement is moderated by age. It implies that changes in peer acceptance have a higher impact in the predicted academic achievement for younger adolescents than for middle adolescents. It also shows that adolescence might not be considered as a unique developmental period at least in terms of social aspects considering that our results showed different influences of peer relationships on academic achievement depending on age during adolescence.

Several mechanisms could account for the capacity of peer acceptance to predict academic achievement although none of them have focused on different stages of adolescence. Those students who are accepted within the peer group have a higher feeling of appertaining to academic life and can put their social abilities into practice more easily as that close cohabitation provides them with the emotional support necessary to improve engagement at school (Wentzel,

2009). Zettergren (2003) suggested that the link between peer acceptance and academic achievement might be caused by the cognitive skills of the subject. This author found that the academic achievement and intelligence level of peer-accepted children were higher than the levels of children from other peer statuses. More research is necessary to deeply know the process surrounded that relationship, nevertheless as our research showed, is needed to pay attention at the different stages of adolescence separately and not together as it was treated.

The finding that friendships was not significant in the model after controlling for academic achievement at Time 1 was unexpected. This was contrary to previous research which suggested that friendships played a significant role in academic achievement (e.g., Wentzel & Caldwell, 1997; Witknow & Fuligni, 2010). It is possible that this pattern of findings is due to peer relationships which are measured at a single point in time are rather poor predictors of changes in academic achievement. Indirect support for this view comes from the observation of Lubbers et al. (2006) that, "associations between aspects of peer relations and academic achievement appear to become less strong or disappear completely when controlling for prior academic level…" (p.495). More longitudinal studies with longer durations to allow for substantial changes measuring peer relationships as well as academic achievement are clearly warranted.

The link presented between peer acceptance and academic achievement in adolescence, moderated by age, also has practical implications, particularly when considered in the light of recent standard-based reform efforts focused on improving students' achievement scores. Youths who can count on support to change their social standing will be able to cope with the stressors present in the school settings and maximize their opportunities for academic achievement. Thus, it may be particularly important to focus intervention efforts on younger

adolescents with low peer acceptance in order to increase their social support network. The strength of the links between peer acceptance and academic achievement suggests that schools may positively impact students' achievement by introducing programs focused on improving peer relationships. The results of this study suggest that implementing interventions on the social aspects of the class could positively influence students' academic achievement, although such interventions should target early adolescence to obtain better results.

A few shortcomings of this study need to be considered. First, the over-time design of the study limits the generalization of the results. Although the analyses conducted in this study are robust, longitudinal analyses should be carried out to evaluate the stability of the effects of peer relationships and age-related differences during adolescence developmental period. It should also be interesting to widen the age sample to explore the whole adolescence period as early, middle and late adolescence and not only the first stages. Finally, future research needs to explore in depth other indicators of social functioning in addition to peer acceptance and academic achievement during early, middle and late adolescence.

In conclusion, the present study was designed to broaden our understanding of peer relationships and academic achievement during adolescence. Our results indicated that peer acceptance plays different roles in adolescents' academic achievement, with a greater effect in first years of adolescence. More research on the role of social functioning—such as peer acceptance—in understanding academic success during different stages of adolescence samples is clearly warranted.

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# ESTUDIO 3

Self-other agreement measures of acceptance in predicting academic achievement: A longitudinal analysis.

## ABSTRACT

Peer acceptance has been linked to academic achievement in adolescents in previous research. Nevertheless, the relation between self-perception of acceptance and academic achievement is not clear. This study proposed a mediational model in which the degree of correspondence of self-other perceptions of acceptance is mediating the relation between self-perception of acceptance and academic achievement. Additionally, due to a lack of consistency regarding the method to assess the degree of correspondence of self-other perceptions of acceptance, four mediators have been tested and compared: status realism, accuracy by the subtraction method, bias by the regression method, and bias by the subtraction method. Data collection was carried out across two time points. The sample consisted of 539 adolescents at Time 1, 701 adolescents at Time 2, and a total of 345 adolescents that participated at both time points. Cross-sectional and longitudinal mediational models revealed different results for each mediator proposed. Only status realism and bias by the subtraction method were significant across time points and longitudinally. Implications regarding the use of the different measures of the degree of correspondence of self-other perception of acceptance are proposed. .

Recently, researchers are beginning to acknowledge that adolescents' social interactions with peers contribute to their overall success and effectiveness in school, including their academic achievement (Rubin, Bukowski, & Laursen, 2009; Wentzel, Donlan, & Morrison, 2012). For example, Schwartz, Gorman, Nakamoto, and McKay (2006) found that adolescents who engaged in negative (highly aggressive) peer relationships showed a decrease in academic achievement and engagement in school, and conversely, adolescents who engaged in positive peer interactions showed a positive relation with academic achievement and engagement in school. Different social mechanisms of the influence of positive peer interactions on academic results have been identified (Altermatt, 2012). Concretely, being accepted by peers —the extent to which one is actively liked, accepted, or preferred by one's peers—increases opportunities to learn adaptive kinds of social behavior, social cognitions, and emotional support that predispose accepted adolescents toward academic success (Parker & Asher, 1987). Consequently, the relation between peer acceptance and academic achievement has been widely documented in a number of studies (e.g., Schwartz, Gorman, Nakamoto, & McKay, 2006; Kingery, Erdley, & Marshall, 2011; Wentzel & Caldwell, 1997).

Because of the importance of peer interactions, for a long time, research on social development has questioned whether we see ourselves as others see us. Given the strong implications of engaging in positive peer interactions for adolescents' academic issues, if adolescents were aware of their social interactions, and their perceptions were similar to their peers' perceptions of them, self-perception of acceptance could be related to academic achievement. Nevertheless, self-perception of acceptance and academic achievement were found to be unrelated (e.g., Malloy, Albright, & Scarpi, 2007), or, in contrast, the relation found in large samples was positive but weak (Jonkmann, Trautwein, & Lüdtke, 2009; Preckel, Niepel, Schneider, &

Brunner, 2013). These results evidenced a lack of concordance between self-perceptions of acceptance and others' perceptions of acceptance, and thus that what we see of ourselves is not the same as others see. The implications of a lack of concordance between self-perceptions and others' perceptions are mainly investigated in adverse outcomes. For instance, research has related differences in self-perceptions from others' perceptions with internalizing behaviors and loneliness (Cillessen & Bellmore, 1999), dysphoria (Kistner, Balthazor, Risi, & David, 2001), depressive symptoms (Kistner, David-Ferson, Repper, & Joiner, 2006), and psychopathologies (Split, Van Lier, Branje, Meeus, & Koot, 2015). Concretely, differences between self-perception of acceptance and acceptance ratings by the peer group have been shown to be associated with aggression (David & Kistner, 2000; White &Kistner, 2011; Stephens, Kistner, &Lynch, 2015) and depressive symptoms (Campbell & Fehr, 1990; Stephens, Kistner & Lynch, 2015). Given these associations, the consideration of discrepancies between self-perception of acceptance and acceptance ratings by the peer group is warranted to identify adolescents who may be at risk for adverse socio-academic outcomes. As Preckel et al. (2013) pointed out, if a relation between self-perception of acceptance and academic outcome is found, it is likely that third variables may account for this relationship through a mediating effect between them, which explains the underlying process.

Despite growing interest in discrepancies between adolescents' self- and other-perceptions of peer acceptance, the methodology employed to calculate a score is not without a great deal of controversy (De Los Reyes & Kazdin, 2004; Gage & Cronbach, 1955; Jussim, 2005; Stephens, Kistner, & Lynch, 2015). Several methods have been used to assess the degree of self-other agreement in perceptions of acceptance (e.g., correlations between participants' ratings, subtracting self-perception ratings from peer ratings). According to Campbell

and Fehr (1990), two large distinctions should be made regarding the degree of agreement between self-perceptions and others' perceptions: on the one hand, *accuracy* of the assessment of discrepancies between self-perceptions and peer perceptions, regardless of the direction; and, on the other hand, *bias* when assessing the discrepancies between self-perceptions and peer perceptions, maintaining the direction of the discrepancies (underestimation versus overestimation of self-perceptions). Research has emphasized the need for both measures to distinguish between absolute levels of agreement between self-perceptions and peer perceptions and the direction of the agreement (Kistner, David-Ferdon, Repper, & Joiner, 2006; Split, Van Lier, Branje, Meeus, & Koot, 2015), defending that both measures can exist side by side (Jussim, 2005). Despite the fact that a distinction has been made between accuracy and bias methods, there are still inconsistencies in the social self-perception literature concerning the choice of the method utilized to compare self-perception ratings versus others' ratings of acceptance: the different mathematical methods used to determine accuracy or bias constitute a barrier to compare results across studies (e.g., correlations between participants' ratings, subtracting self-perception ratings from peer ratings). A consensus in social self-perception research about when it is appropriate to use each method is highly recommended to make studies comparable and achieve a sense of methodological coherence in the field.

Accuracy has mainly been assessed via two methods. The first method consists of calculating the correlation between self-perception of acceptance ratings and acceptance ratings by the peer group. In this case, accuracy denotes the degree to which self-perception of acceptance and peer acceptance ratings are related. The second method used to assess accuracy consists of determining whether self-perception ratings of acceptance have the same mean as peer acceptance ratings in absolute value. The mathematical properties of each

method used to assess accuracy produce different level results as an effect of the procedure used. Accuracy calculated by the correlation method (correlation between peer acceptance rating and self-perception rating) is a group measure, and conversely accuracy calculated by the subtraction method (the absolute value of the difference between each pair of self-perception of acceptance and peer ratings of acceptance) is an individual measure. Research conducted with accuracy through the correlation method found a moderate relation between acceptance self-perception and peer acceptance ratings (Badaly, Schwartz, & Hopmeyer, 2012; Cillessen & Bellmore, 1999; McElhaney, Antonishak, & Allen, 2008; Salley, Vannatta, & Gerhardt, 2010). Research on accuracy conducted with the second method showed that the relation between self-perceived and peer acceptance ratings was moderate (Kistner, David-Ferdon, Repper, & Joiner, 2006; Salley, Vannatta, & Gerhardt, 2010; Smith, Van Gessel, David-Ferdon, & Kistner, 2013). Although both methods seem to produce similar results, comparisons of the scores of accuracy in both methods showed that accuracy of self-other agreement methodologies of perceptions of acceptance were unrelated (Funder, 1980) or weakly related (Smith, Van Gessel, David-Ferdon, & Kistner, 2013). In light of this result, instead of the two accuracy methods measuring the same process, each method assesses a different aspect of the discrepancies of social self-perception of acceptance.

The examination of biased self-perceptions is concerned with the degree to which one's self-perceptions of acceptance are either underestimated or overestimated when compared with peer acceptance rating. The two most commonly used methods to assess biased self-perceptions of acceptance are: on the one hand, by subtracting peer acceptance rating from self-perception rating of acceptance (bias by the subtraction method), and, on the other hand, by standardizing residual scores derived from regressing self-perception rating

of acceptance onto peer acceptance rating (bias by the regression method). The mathematical properties underlying each method to assess biased self-perception of acceptance have the potential to produce different results (e.g., differences in correlations between adolescents' acceptance ratings or between variances of adolescents' acceptance ratings) (for a review of further methodological issues of the two methods, see Stephens, Kistner, & Lynch, 2015). Recently, a comparative study of biased methods of self-perception of acceptance found that bias by the subtraction method was more strongly related to aggression than was bias by the regression method, and conversely, bias by the regression method correlated more strongly with depressive symptoms than did bias by the subtraction method (Stephens, Kistner, & Lynch, 2015). In addition, De Los Reyes and Kazdin (2004) found different results with a sample of children with externalizing behavior problems when comparing the two biased self-perception methods. Therefore, bias by subtraction and bias by regression seem to measure different aspects of the discrepancies of social self-perceptions of acceptance. The need to contrast and compare methodological issues concerning the different measures of biased self-perception of acceptance is warranted.

Research in social self-perceptions of acceptance has also been examined from the field of sociometry. Barrasa and Gil (2004) developed a measure to evaluate the degree of social self-perceptions of acceptance, *status realism*. The measure is defined as the correct degree of correspondence between the peer acceptance nominations received and the self-perception of acceptance nomination registered, discerning who had made the nominations. For example, if B nominated A as accepted, and A's self-perception of acceptance rating included B personally, then, a correspondence is considered to exist between self-peer perceptions of acceptance. Although we found no comparative results between status realism and any other measure of social

self-perception of acceptance, conceptually and mathematically, status realism seems to be quite close to other measures of social self-perception of acceptance (e.g., accuracy by the subtraction method). Therefore, we considered it would be interesting to include status realism in a comparison of social self-perception of acceptance measures.

Thus, having reviewed the methodological controversy about the degree of agreement between self-perception of acceptance and peer perception of acceptance and its possible implications in academic issues, the present study proposes three main goals. The first aim of the study is to explore the relation among peer acceptance, self-perception of acceptance, the different measures of the degree of agreement between self-perceptions and other-perceptions of acceptance (accuracy by the subtraction method, bias by the regression method, bias by the subtraction method, and status realism), and academic achievement. We hypothesized that: a) peer acceptance is positively related to academic achievement; b) self-perception of acceptance has a lower relationship with academic achievement than does peer acceptance; c) accuracy by the subtraction method, bias by the regression method, bias by the subtraction method, and status realism are related.

Furthermore, the second issue of interest consists of the notion pointed out by Preckel, Niepel, Schneider, and Brunner (2013): if a relation between self-perception of acceptance and academic achievement is found, it is likely that third variables may account for this relation through a mediating effect between them, which explains the underlying process. Accordingly, the second goal of the study is to propose a mediational model in which the degree of agreement between self-perception of acceptance rating and peer acceptance rating underlies the relation between self-perception of acceptance and academic achievement. We hypothesized that: d) self-perception of acceptance is related to academic achievement via the degree of agreement between self-

peer perceptions of acceptance (accuracy by the subtraction method, bias by the regression method, bias by the subtraction method, and status realism).

Moreover, we considered that studies may find different outcomes depending on which method of agreement between self-peer perceptions of acceptance were used in the analysis. Thus, the third aim of the study is to compare the strength of the mediators (accuracy by the subtraction method, bias by the regression method, bias by the subtraction method, and status realism) in the mediational models between self-perception of acceptance and academic achievement. In addition, in order to explore the consistency and stability of the mediators, the mediational models are conducted at another time point and longitudinally. We hypothesized that: e) the strength of the relations of the mediator on the independent variable (self-perception of acceptance) and on the outcome variable (academic achievement) are different for each mediator (accuracy by the subtraction method, bias by the regression method, bias by the subtraction method, and status realism). Accuracy by the correlation method have not been included in the present study because of it is a group level measure and the present study has adopted an individual level of analyses, and thus, a group level measure should not be compared with individual level measures.

## METHOD

### PARTICIPANTS

Participants were students from 1st grade through 4thgrade (equivalent to 7st-10th grade in the USA) recruited from 5 secondary schools in the northeast of Spain. Data from this study were collected at two time points with a 6-month interval: Time 1 (T1) during the spring semester ($N$ = 539, $M_{age}$ = 14.07, $SD$ = 1.46, 51% females) and Time 2 (T2) during the fall semester of the following year ($N$ = 701,

$M_{age}$ = 13.70, *SD* = 1.40, 52% females). A total of 345 students participated, completing all the measures at both time points.

## MEASURES

**Sociometric measures.** Adolescents were given a list with the names of their classmates to respond to the questions "Who do you like the most?" and "Who do you think likes you?" Nominations for both questions were unlimited. The adolescents could include as many or as few classmates as they wished in both answers, including same- and other-gender peers, but not themselves. The adolescents in each classroom knew each other well; thus, each class was the reference group. Sociometric indexes were calculated using the CIVSoc software (Barrasa & Gil, 2004). This procedure is identical to was used by Zakriski and Coie (1996) to assess sociometric measures.

*Peer acceptance.* The software procedure used to calculate an adolescent's peer acceptance score was the number of nominations received divided by the number of students in class minus one. The value ranges from 0 (minimum) to 1 (maximum). The temporal stability of the measure in our sample was .48, $p < .001$

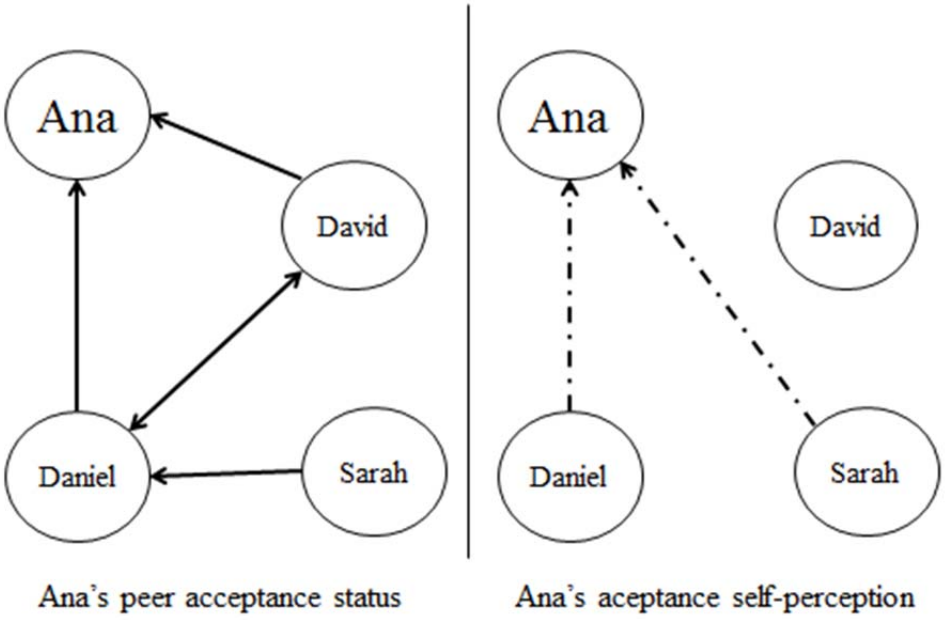
An example is shown in Figure 1. Ana's peer acceptance score would be the number of nominations received (in this case: David + Daniel = 2) divided by the members of the group minus one (Ana + David + Daniel + Sarah = 4; 4 – 1 = 3) resulting in a score of .67 (2/3 = .67). This implies that Ana has a relatively high peer acceptance score.

*Self-perception of acceptance.* An adolescent's self-perception of acceptance score was the number of nominations expected by each student divided by the actual number of nominations in the group, minus one. The value

ranges from 0 (minimum) to 1 (maximum). The temporal stability of the measure in our sample was .49, $p < .001$

In the example shown in Figure 1, Ana's self-perception of acceptance score would be the number of her expected nominations (in this case: Sarah + Daniel = 2) divided by the members of the group minus one (Ana + David + Daniel + Sarah = 4; 4 – 1 = 3), resulting in a score of .67. This shows that Ana thinks she has a relatively high acceptance score within the group.

*Figure 1.* Example of Ana.




## Self-other agreement measures

*Accuracy by the subtraction method* was calculated as the absolute value of the difference between each pair of peer acceptance ratings and self-perception of acceptance ratings for each participant. Low scores in accuracy indicate a close relation between peer acceptance and self-perceived acceptance, and thus, more self-other agreement. This method of calculating accuracy has been used before (e.g., Dunkel, Kistner, & David-Ferdon, 2010; Kistner, David-Ferdon, Repper, & Joiner, 2006; Smith, Van Gessel, David-

Ferdon, & Kistner, 2013). The temporal stability of the measure in our sample was .20, $p < .001$

In Figure 1, Ana's accuracy by the subtraction method would be the absolute value of her peer acceptance score (David + Daniel / David + Daniel + Sarah + Ana – 1 = .67) minus her self-perceived acceptance score (Daniel + Sarah / David + Daniel + Sarah + Ana – 1 = .67), which equals zero (/.67 – .67/ = 0). This indicates that the self-other agreement between Ana and her peers is perfect. This has the important implication that Ana is totally aware of her social relationships.

*Bias by the regression method* was measured by the standardized residual scores derived by regressing self-perception of acceptance ratings onto peer acceptance ratings, resulting in a continuum ranging from overestimation (positive values) to underestimation (negative values). This method has been used in previous research (e.g., Kistner, David-Ferdon, Repper, & Joiner, 2006). The temporal stability of the measure in our sample was .41, $p < .001$.

Ana's score of bias by the regression method cannot be computed with the data of Figure 1.

*Bias by the subtraction method:* For each participant, peer acceptance ratings were subtracted from self-perception of acceptance ratings, resulting in a continuum where positive values indicate overestimates of peer acceptance and negative values indicate underestimates. Values around zero reflect a perfect self-other agreement between self-perception of acceptance ratings and peer acceptance ratings. Previous studies have assessed bias by this method (e.g. Mikami, Calhoun, & Abikoff, 2010; Smith, Van Gessel, David-Ferdon, & Kistner, 2013). The temporal stability of the measure in our sample was .29, $p < .001$

In Figure 1, Ana's bias score by the subtraction method would be her self-perceived acceptance score (Daniel + Sarah / David + Daniel + Sarah + Ana – 1 = .67) minus the peer acceptance score (David + Daniel / David + Daniel + Sarah + Ana – 1 = .67), which equals zero (.67 –.67 = 0). This indicates that the self-other agreement between Ana and her peers is perfect. This has the important implication that Ana is totally aware of her social relationships.

*Status realism.* To score in status realism, adolescent's nominations by peers must correspond with his or her expected self-perceptions of acceptance nominations rating, personally. The status realism score is the number of correspondences between peer nominations and expected peer nominations divided by the number of expected peer nominations (Barrasa & Gil, 2004). The value ranges from 0 (minimum) to 1 (maximum). Values of status realism close to 1 indicate high self-other agreement. The temporal stability of the measure in our sample was .26, $p < .001$

In Figure 1, Ana received nominations from David and Daniel, and in her self-perception of acceptance she expected to be nominated by David and Sarah. Accordingly, Ana's number of correspondences between the nominations by peers and her expected nominations by peers is only 1, David. Therefore, Ana's status realism score would be the number of correspondences produced (in this case: David = 1) divided by the number of Ana's expected nominations by peers (David + Sarah = 2), giving a score of .5. This shows that Ana's degree of self-other agreement with her peers is medium. This has the important implication that Ana is not totally aware of her social relationships.

Academic achievement. This was measured with the students' report-cards of grades issued by the secretariat of the high school at two time points (T1 and T2). Grades are on a continuous scale ranging from 0 to 10, with 10

indicating a perfect score, and grades of less than 5 indicating failure to pass. The temporal stability of the measure in our sample was .85, $p < .001$

## PROCEDURE

Data collection was carried out during the spring of 2012 and the following Fall semester (with a 6-month interval) in the students' classrooms at school, during regular classes. To ensure that there was no bias due to reading difficulties, a member of the research team read and explained each item aloud to the class, while at least two assistants remained in the room to monitor students' progress and answer any questions. Before completing the sociometric and demographic measures by computer, we explained to the students that all of their answers were confidential and they did not have to answer any question if they did not want to. Participation in the study required parental consent and individual assent.

## STATISTICAL ANALYSIS

Firstly, an overview of the variables is presented, including the means, standard deviations and correlations among academic achievement, peer acceptance, self-perception of acceptance, and all the self-other agreement measures of perception of acceptance.

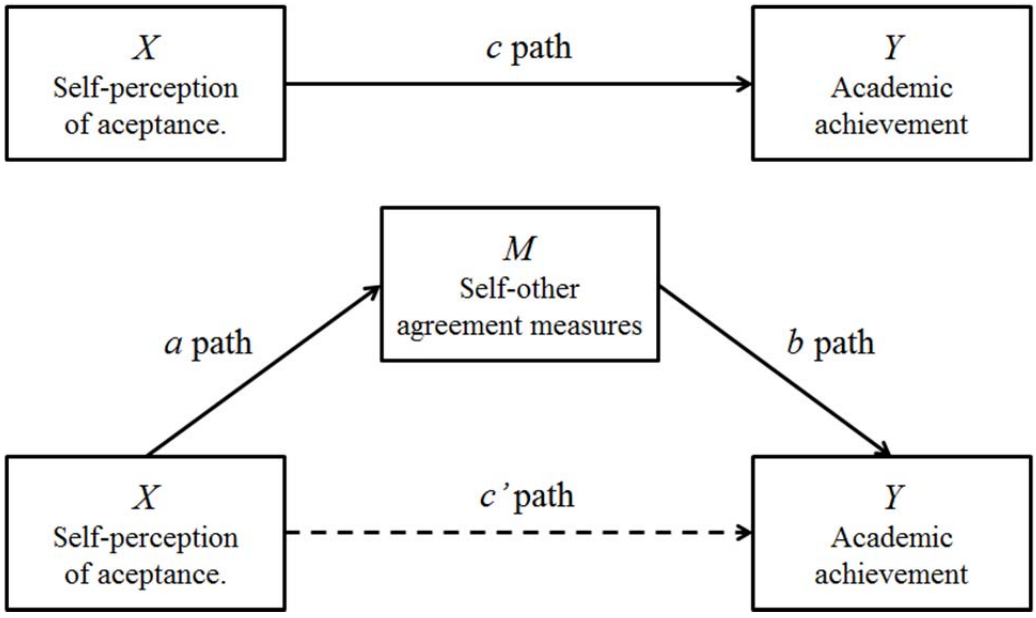
Secondly, four cross-sectional mediation bootstrap analyses were used to test the indirect effect of self-perception of acceptance on academic achievement via status realism, accuracy by the subtraction method, bias by the regression method, and bias by the subtraction method at Time 1. In order to analyze the stability and consistency of the results, the four cross-sectional mediation bootstrap analyses were also conducted with Time 2 data.

Finally, four longitudinal mediation bootstrap analyses were conducted, in which self-perception of acceptance at T1 was the predictor, and academic

achievement at T2 was the outcome variable, and status realism at T1, accuracy by the subtraction method at T1, bias by the regression method at T1, and bias by the subtraction method at T1 served as mediators of each model.

A total of 12 mediation models (see Figure 2) were conducted using a nonparametric bootstrapping procedure for indirect effects, PROCESS SPSS macro (Preacher & Hayes, 2008). This method provides an estimation of the indirect effect determined by the mean of 5,000 estimates of the indirect effect (a-b), to calculate *p*-values and construct 90% or 95% confident intervals (CIs), biased corrected and accelerated. When zero was not included among the CIs, indirect effects were considered significant. Furthermore, this method has been highly recommended for mediational analyses because it yields more accurate parameter estimates, because of the lower likelihood of committing Type I and II errors, and because the statistical power remains high, compared to previous mediational methods (Hayes, 2009; Rucker, Preacher, Tormala, & Petty, 2011).

*Figure 2*. Conceptual diagram of the mediation models proposed.



## RESULTS

Means, standard deviations, and correlations for all study variables at T1 and T2 are shown in Table 1. Academic achievement was positively related to peer acceptance, both cross-sectionally and longitudinally, whereas self-perception of acceptance was positively related to academic achievement only longitudinally. Likewise, academic achievement was positively related to status realism, and bias by the regression method only in cross-sectional analyses. Furthermore, self-perception of acceptance and peer acceptance ratings were found to be positively related in cross-sectional and longitudinal analyses. Concretely, the degree of self-other agreement of the sample calculated as accuracy by the correlation method had a score of .24 at T1, .39 at T2, and .18 in the longitudinal analysis. These results show that the sample had values of accuracy by the correlation method of medium effect sizes.

We tested different measures of self-other agreement (status realism, accuracy by the subtraction method, bias by the regression method, and bias by the subtraction method) as mediators between self-perception of acceptance and academic achievement in cross-sectional (T1 and T2) and longitudinal analyses (T1 predicting T2 outcome). Table 2 depicts the results of the mediation analyses. The results of the bootstrapping method used in the four models developed at T1 revealed an indirect effect of self-perception of acceptance on academic achievement via status realism, accuracy by the subtraction method, and bias by the subtraction method with a 95% CI. Specifically, a high level of self-perception of acceptance was related to a low level of status realism, which in turn, was positively associated with academic achievement. A high level of self-perception of acceptance was also related to a high level of accuracy, which in turn, was associated with a low level of academic achievement. Additionally, a high level of self-perception of acceptance was

related to a high level of bias by the subtraction method, which in turn, was associated with a low level of academic achievement. The indirect effect of self-perception of acceptance on academic achievement through bias by the regression method was nonsignificant, as a result of the fact that the CIs included zero.

Mediational analyses conducted at T2 showed that only the indirect effects of status realism and bias by the subtraction method were significant, as shown by the fact that the CIs did not contain zero.

To test whether mediation occurred longitudinally, we developed four models in which status realism at T1, accuracy at T1, bias by the regression method at T1, and bias by the subtraction method at T1 were introduced as mediators between the relation of self-perception of acceptance at T1 on academic achievement at T2. The models that contain status realism, bias by the regression method, and bias by the subtraction method as mediators were significant, as shown by CIs that did not include zero. Specifically, self-perception of acceptance at T1 was related to a low level of status realism at T1, which in turn, was associated with a high level of academic achievement at T2. A high level of self-perception of acceptance at T1 was related to a high level of bias by the regression method at T1, which in turn, was associated with a high level of academic achievement at T2. Additionally, a high level of self-perception of acceptance at T1 was related to a high level of bias by the subtraction method at T1, which in turn, was associated with a low level of academic achievement at T2. The mediational model of self-perception of acceptance at T1 on academic achievement at T2 via accuracy by the subtraction method at T1 contained zero, and was therefore statistically nonsignificant.

Table 1

Means, Standard Deviations and Correlations among the variables of the study are shown.

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Peer acceptance T1 | - | .24 | .49 | .23 | .97 | –.39 | .20 | .48 | .18 | .22 | .22 | .45 | –.16 | .13 |
| 2. Acceptance self-perception T1 | | - | –.16 | .63 | .01 | .80 | .08 | .39 | .49 | –.05 | .19 | .28 | .18 | .19 |
| 4. Accuracy-S T1 | | | - | –.08- | .09 | .45 | –.02 | .22 | .21 | –.02 | .20 | .18 | .04 | .10 |
| 5. Bias-RT1 | | | | - | .54- | –.59 | .19 | .41 | .08 | .24 | .18 | .41 | –.21 | .10 |
| 6. Bias-ST1 | | | | | - | –.45- | –.05 | .06 | .36 | –.19 | .04 | –.02 | .29 | .09 |
| 3. Status realism T1 | | | | | | - | .12 | .12 | –.10 | .26 | –.01 | .15 | –.18 | .06 |
| 7. Academic achievement T1 | | | | | | | - | .23 | .04 | .18 | .02 | .23 | –.12 | .85 |
| 8. Peer acceptance T2 | | | | | | | | - | .25 | .45 | .48 | .97 | –.41 | .26 |
| 9. Acceptance self-perception T2 | | | | | | | | | - | –.21 | .46 | .00 | .78 | .07 |
| 11. Accuracy-S T2 | | | | | | | | | | - | -.08 | .38 | .12 | .06 |
| 12. Bias-RT2 | | | | | | | | | | | - | -.51 | –.63 | .25 |
| 13. Bias-ST2 | | | | | | | | | | | | - | –.49- | –.11 |
| 10. Status realism T2 | | | | | | | | | | | | | - | .17 |
| 14. Academic achievement T2 | | | | | | | | | | | | | | - |
| M (SD) | .24 (.13) | .25 (.20) | .15 (.14) | .00 (1.0) | .01 (.21) | .48 (.33) | 5.94 (1.69) | .31 (.15) | .25 (.22) | .18 (.16) | .00 (1.0) | –.05 (.24) | .60 (.31) | 5.97 (1.46) |

Note. Significant correlations are shown in italics $p < .05$. Accuracy-S = Accuracy by the subtraction method; Bias-R = bias by the regression method; Bias-S = bias by the subtraction method

Table 2.
*Mediational models proposed between self-perception of acceptance and academic achievement.*

| Models | Mediating variable (*M*) | Effect of *IV* on *M* (*a*) | Effect of *M* on *DV* (*b*) | Direct effect (*c'*) | Indirect effect | | Total effect (*c*) | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| | | | | | (*axb*) | 95% *CI* | | |
| Cross-sectionally Time 1 (*N* = 539) *IV* = Self-perception of acceptance T1 *DV* = Academic achievement T1 | Accuracy-S T1 | 0.45** | –1.39* | 1.29** | *–0.63* | (–1.28, –.05) | 0.66 | .02 |
| | Bias-R T1 | 0.04 | 0.32** | 0.65 | 0.01 | (–.12, .15) | 0.66 | .04 |
| | Bias-S T1 | 0.85** | –2.50** | 2.77** | *–2.11* | (–3.11, –1.17) | 0.66 | .04 |
| | Status realism T1 | –0.25** | 0.72** | 0.85* | *–0.18* | (–.34, –.08) | 0.66 | .03 |
| Cross-sectionally Time 2 (*N* = 701) *IV* = Self-perception of acceptance T2 *DV* = Academic achievement T2 | Accuracy-S T2 | 0.33** | 0.34 | 0.32 | 0.11 | (–.13, .35) | 0.43 | .01 |
| | Bias-R T2 | 0.00 | 0.37** | 0.43 | 0.00 | (–.10, .12) | 0.43 | .07 |
| | Bias-S T2 | 0.83** | –2.47** | 2.48** | *–2.05* | (–2.56, –1.48) | 0.43 | .07 |
| | Status realism T2 | –0.30** | 0.89** | 0.69** | *–0.26* | (–.40, –.15) | 0.43 | .04 |
| Longitudinally (*N* = 345) *IV* = Self-perception of acceptance T1 *DV* = Academic achievement T2 | Accuracy-S T1 | 0.37** | –0.35 | 1.54** | –0.07 | (–.42, .30) | 1.41** | .03 |
| | Bias-R T1 | 0.58* | 0.17* | 1.31** | *0.10* | (.01, .32) | 1.41** | .05 |
| | Bias-S T1 | 0.78** | –1.37* | 2.47** | *–1.06* | (–2.19, –.21) | 1.41** | .05 |
| | Status realism T1 | –0.21* | 0.52* | 1.52** | *–0.11* | (–.26, –.02) | 1.41** | .05 |

*Note*. Significant indirect effects are shown in italics. Accuracy-S = Accuracy by the subtraction method; Bias-R = bias by the regression method; Bias-S = bias by the subtraction method.
* $p < .05$; ** $p < .01$

## DISCUSSION

This research proposed a mediational model in which the degree of agreement between self-perception of acceptance rating and peer acceptance underlies the relation between self-perception of acceptance and academic achievement. Moreover, considering that the existent methods to assess the degree of agreement between self-peer acceptance ratings have unique mathematical properties which have the potential to produce differences in scores, comparisons among self-peer agreement measures of acceptance have been conducted cross-sectional and longitudinally. Findings from the present study show important differences in the strengths of each method assessed.

The first aim of the present study was to explore the relation among academic, achievement, peer acceptance, self-perception of acceptance, and the different measures of the degree of agreement between self-peer perceptions of acceptance. Our first hypothesis (a) was confirmed: Peer acceptance and academic achievement were positively related at T1, T2, and from T1 to T2. This result is in accordance with the study of Kingery, Erdley, and Marshall (2011). Additionally, the direction from peer acceptance at T2 to academic achievement at T1was nonsignificant, confirming the suggested effect of the direction from peer acceptance to academic achievement (Wentzel & Caldwell, 1997). Our second hypothesis (b) was partially confirmed: Self-perception of acceptance and academic achievement were not related, except for self-perception of acceptance at T1 and academic achievement at T2. This is in accordance with the results found previously showing no relation or a weakly relation among terms (Malloy, Albright, & Scarpi, 2007; Preckel, Niepel, Schneider, & Brunner, 2013). However the relation found between self-perception of acceptance at T1 and academic achievement at T2 was stronger than the relation showed between peer acceptance at T1 and academic

achievement at T2. This correlation results suggest that self-perception of acceptance may affect future behaviors, but it is not related to actual behaviors. Furthermore, we expected the measures of self-peer perceptions of acceptance were related (hypothesis c). Status realism was larger related to both bias methodologies than to accuracy methodology. Accuracy by the subtraction method showed the strongest relation with bias by subtraction method at T1, and on the contrary accuracy by subtraction method showed the strongest relation with bias by regression method at T2. Regarding the bias methodologies to assess the degree of correspondence between self-peer perceptions of acceptance, the results showed a large relation between both methodologies as also found Stephens, Kistner, and Lynch (2015). These results support the notion that the different measures of self-peer perceptions of acceptance underlie different process (Funder, 1980; Smith, Van Gessel, David-Ferdon, & Kistner, 2013).

The second aim of the present study was to test a mediational model in which the degree of agreement between self-perception of acceptance and peer acceptance ratings underlie the relation between self-perception of acceptance and academic achievement. Results of the mediational models conducted at T1 showed that status realism, accuracy by the subtraction method, and bias by the subtraction method resulted significant mediators between self-perception of acceptance and academic achievement. Mediational analyses at T2 revealed that status realism and bias by the subtraction method were the only significant mediators between self-perception of acceptance and academic achievement. Longitudinally, the mediation models results showed that status realism, bias by the regression method, and bias by the subtraction method resulted significant as mediators between self-perception of acceptance and academic achievement. These results support our fourth hypothesis (f) partially. All the proposed measures of agreement

between self-peer perceptions of acceptance have not been resulted significant. Concretely, the mediational model of accuracy by the subtraction method as mediator was not significant at T2, nor longitudinally. The mediational model of bias by regression method only resulted significant longitudinally. Nevertheless, the mediational models that contained status realism and bias by the subtraction method as mediators between self-perception of acceptance and academic achievement were significant cross-sectional and longitudinally. These findings support the notion that some measures of self-peer perceptions of acceptance (status realism and bias by the subtraction method) are mediating the relation between self-perception of acceptance and academic achievement. Self-perception of acceptance may influence academic achievement cross-sectional and longitudinally, if the degree of correspondence between self-perception and peer acceptance ratings is taken into account.

The third aim of the present study was to compare the strength of the relations in the mediational models proposed. According to our fifth hypothesis (e) the strength of the relations of the mediators on the independent variable (self-perception of acceptance) and on the outcome variable (academic achievement) were different. Only status realism and bias by the subtraction method were mediators between self-perception of acceptance and academic achievement in cross-sectional and longitudinal analyses. Comparing both mediators, bias by the subtraction method showed a higher indirect effect and a slightly higher portion of explained variance of academic achievement than status realism did. Beyond these mediators, accuracy by subtraction method and bias by the regression method presented inconsistencies. Accuracy by the subtraction method was related with academic achievement only at T1, consequently only the mediational model displayed at T1 mediating by accuracy by the subtraction method was significant. Similarly, bias by the

regression method was related to self-perception of acceptance only longitudinally and thus, the longitudinal model containing bias by the regression method was the only significant model. These results are in line with the emerged differences when Stephens, Kistner, and Lynch (2015) compared methods to assess the degree of correspondence between self-perception of acceptance and peer acceptance. Beyond the methodological differences displayed, the authors found that the different measures of bias contrasted (bias by the regression method vs. bias by the subtraction method) had different outcomes correlations. More discrepancies in results have been produce, for example, previous research showed that biased self-perceptions (by the regression method) do not predict changes in depressive symptoms (Kistner, Balthazor, Risi, & David, 2001), and, in contrast, bias assessed with the same method was previously related to psychological dysfunctions such as depressive symptoms (Hoffman, Cole, Martin, Tram, & Seroczynski, 2000).These findings suggest that the different measures of self-peer perceptions of acceptance are not equivalent. In our study, status realism and bias by the subtraction method presented the higher stability across time points, and longitudinally than the others measures analyzed. According to these results, status realism and bias by the subtraction method presented the best methodological aspects to assess a mediational model between self-perception of acceptance and academic achievement.

This is the first study that proposes a mediational model between self-perception of acceptance and academic achievement via the degree of agreement between self-other perceptions of acceptance. The resulting models showed inconsistencies in the measures tested (status realism, accuracy by the subtraction method, bias by the regression method, and bias by the subtraction method). Concretely, the fact that each mediator tested showed different relations in the model, or even instability of the results across time points.

Surprisingly, only status realism and bias by the subtraction method displayed significant and stable results cross-sectional and longitudinally. These results denote the stability as mediators between self-perception of acceptance and academic achievement of both measures and thus, the use of both mediators are recommended between self-perception of acceptance and academic achievement. Therefore, methodological and conceptual aspects of the measures self-other perceptions of acceptance should be considered, for instance, the choice of the method which corresponds best to the object of the study or the relations associated to the method selected.

## LIMITATIONS

The findings described above should be considered with regard to the following limitations: First, although four different methodologies to assess the degree of correspondence of self-peer perception of acceptance have been tested, this study did not cover all the measures that exist in the field (e.g., Realistic accuracy model: Funder, 1995). Further research on the topic is warranted. Secondly, we drew on non-componential measures of the degree of correspondence between self-peer perception of acceptance, which does not allow us to provide an explanation of how a person achieves an (in) accurate perception, the role of the perceiver in the process, or the interaction in person perception, and thus offer information about the processes of perceptions (Gage & Cronbach, 1955). We suggest the use of componential (e.g., Social relations model: Kenny, 1994) and non-componential approaches in order to evaluate reliabilities and correspondences between these two approaches. A third limitation worth considering is that data collection was at the end of an academic course and again at the beginning of the following academic course. This only represents a single advance in time data collection. Thus, our results cannot be compared to other course transitions or even be

generalized to other domains. Further longitudinal research is warranted to establish causal relationships.

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# ESTUDIO 4

Different paths to deal with loneliness among adolescents: A longitudinal study.

## ABSTRACT

Loneliness has been linked to physical and mental health problems during adolescence. Motivational, emotional, and social approaches have found support separately for their implications. From an integrative perspective, this study examined whether emotional repair, relatedness need, and indicators of peer relations influenced loneliness longitudinally among adolescents. The sample consisted of 373 students attending five different high schools. Results of a cross-lagged panel design with three time points showed different paths of influence on loneliness. Adolescents who were accepted by their peers or those whose relatedness need was satisfied activated emotional regulation which, in turn, produced a decrease of prospective feelings of loneliness. However, adolescents who initially activated emotional repair increased their feelings of loneliness and did not satisfy their relatedness need and thus, experienced prospective loneliness. Moreover, rejection by the peer group directly influenced future feelings of loneliness whereas being accepted implied prospective activation of emotional repair, and thus, fewer feelings of loneliness. In addition, by comparing nested models, loneliness has been shown to be a consequence of emotional repair, relatedness need, and peer relation experiences. In the light of the results, directions for practical intervention approaches have been proposed.

Loneliness is usually described as a cognitive awareness of the discrepancies between current relationships and the relationships one would like to have (Asher & Paquette, 2003). As such, it involves perceived deficiencies in social relationships, dissatisfaction with social interactions, or social difficulties. Many authors emphasize the emotional discomfort or distress of loneliness, suffered as a result of one's social experiences (e.g., Qualter et al., 2015). Loneliness may be experienced at a situational point for most people, but it can also be a normative or chronic emotional response. In the latter case, loneliness places individuals at risk for poor psychological outcomes. In particular, failure to resolve loneliness has been associated with psychological difficulties (e.g., low self-esteem, low social competence), mental health problems (e.g., depression, anxiety disorders, substance use, suicidal ideation), and physical issues (e.g., eating disorders, sleep disturbances, and poorer cardiovascular functioning) (Cacioppo et al., 2002; Heinrich & Gullone, 2006; Qualter et al., 2015; Vanhalst, Luyckx, & Goossens, 2014).

Human beings have an innate need to belong, a need for social connection (Bausmeister & Leary, 1995), and thus, an absolute or relative lack of social relationships may lead to loneliness. Surprisingly, adolescence is the developmental period when loneliness is more prevalent compared to more advanced developmental periods (for review, see Qualter et al., 2015). Adolescence is marked by social, cognitive and physical maturation developmental changes that alter the content and frequency of social interactions (Rubin, Bukowski, & Laursen, 2009). The adolescent's social world rapidly changes social expectations, roles, relationships, and personal identities, which may increase the risk for experiencing the painful emotional response of loneliness.

Peer relationships have been shown to be the main source of loneliness among adolescents (Asher & Paquette, 2003; Heinrich & Gullone, 2006; Qualter et

al., 2015). Thus far, research has assessed the individual's situation within a group to determine acceptance and rejection by peers as indicative of peer relationships (Cillessen & van den Berg, 2012). Consistent findings have associated peer acceptance negatively with loneliness (Buhs & Ladd, 2001; Mouratidis & Sideritis, 2009; Woodhouse, Dykas, & Cassidy, 2011) and peer rejection positively with loneliness (Crick & Ladd, 1993; Betts & Stiller, 2014; Pedersen, Vitaro, Barker, & Borge, 2007). In the light of the results, positive peer interactions seem to buffer one against loneliness. On the contrary, feelings of loneliness increase among individuals who experience peer difficulties, and thus are at risk for being rejected by the peer group.

Loneliness may be marked by a lack of social relationships, an unsatisfied need of connection or some peer difficulties. As pointed out by Asher and Paquette (2003): "It is possible to have many friends and still feel lonely. Likewise, it is possible to be poorly accepted by the peer group or to lack friends and yet to not feel lonely". A small network may satisfy one's social needs, such that low scores are observed in loneliness and vice versa. Several theorists on loneliness support this postulate: unsatisfied social needs or an unsatisfied need to belong lead to feelings of loneliness (Baumeister & Leary, 1995; Heinrich & Gullone, 2006; Weiss, 1973). Within the framework of the self-determination theory (STD; Deci & Ryan, 1985), loneliness occurs when the basic psychological needs (autonomy, competence, and relatedness) are not fulfilled. More specifically, relatedness has exhibited the highest relation with all of the subscales of the UCLA Loneliness Scale (Russell, 1996), which is the most commonly used loneliness measure (Heinrich & Gullone, 2006). Relatedness has been defined as a basic psychological need to feel connected to, and mutually supportive of, significant others (Deci & Ryan, 1985). As such, Wei et al. (2005) found a high negative relation between relatedness and loneliness in

a sample of youths. Adolescents whose relatedness need was satisfied reported low feelings of loneliness.

Recently, from an integrative perspective on loneliness, Martín-Albo et al. (2015) investigated the role of emotional issues. They found that, when the need for relatedness is unmet, emotional repair played a key role in loneliness. In particular, the ability to regulate emotional states influenced feelings of loneliness in adolescents. In this line, emotional repair has been linked to psychological adjustment (Extremera, Durán, & Rey, 2007; Thompson et al., 2007) and is expected to specifically influence feelings of loneliness (Zysberg, 2012). Martín-Albo et al. proposed two different mechanisms through which adolescents deal with loneliness, depending on their need for relatedness and their ability to regulate emotions (repair). Adolescents with unsatisfied relatedness need may regulate emotions by directly improving social relationships, thereby also improving their perception of social connections. The second mechanism proposed postulates that adolescents may regulate loneliness either by increasing their perception of social connection or by reducing the importance of social relationships through thoughts (e.g., "I am not alone, my friends are busy today" or "It is not bad to be alone, I can do whatever I want"). Nevertheless, the results of the study are based on cross-sectional data, which do not permit establishing causal relations. Regardless of the limitations, the study has shown the key role of emotional regulation in feelings of loneliness.

To summarize, research on loneliness has shown it to be related to social relationships. Therefore, peer acceptance tends to play a buffering role in adolescents' loneliness (Woodhouse, Dykas, & Cassidy, 2011), and, on the contrary, peer rejection is positively associated with feelings of loneliness (Pedersen, Vitaro, Barker, & Borge, 2007). Furthermore, research on adolescent loneliness has shown the crucial relevance of satisfying the social

need to connect to others or feel that one belongs. For example, Wei et al. (2005) found that adolescents who felt connected to others decreased their feelings of loneliness. In addition, emotional theories have shown that the ability to regulate emotions increases the likelihood of positive social interactions and the chance to decrease loneliness throughout different mechanisms (Martín-Albo et al., 2015). Our main goal was to integrate the different perspectives reviewed that predict loneliness. Consequently, this study is of an exploratory nature, considering that, to our knowledge, no study has yet analysed longitudinally social relationship indicators, the motivational need to connect, and emotional perspectives in the study of loneliness. In this sense, we tested a model with longitudinal analyses to determine whether emotional regulation, motivational need for relatedness, and peer relations influence loneliness among adolescents. Following previous evidence on peer relations, relatedness need, and emotional repair, we hypothesized: (a) a positive association between peer rejection and loneliness; (b) a negative association between peer acceptance and loneliness; (c) a negative association between relatedness and loneliness; (d) a negative association between repair and loneliness; and (e) a positive association between repair and relatedness. So far, research has focused on peer relations, relatedness, and repair as antecedents of loneliness. Our second aim was to test longitudinally whether, within our model, loneliness is a consequence or a precedent of emotions, motivations, and social relationships. We hypothesized that: (f) the model of loneliness as a dependent variable will better fit the data than the model in which loneliness acts as predictor of peer relations, relatedness, and repair, and than the stability model.

# METHOD

## PARTICIPANTS

Participants were students from 1st grade through 4thgrade (equivalent to 7st-10th grade in the USA) recruited in the northeast of Spain. The sample was selected using multi-phase sampling as follows. First, stratified sampling was performed to select the secondary schools (5 centers participated in the study). Second, in the first phase, we performed cluster sampling in each of the selected centers, taking as the unit of analysis the classroom (36 classrooms participated). Data from this study were collected at three time points with a 6-month interval: Time 0 (T0) during fall semester, Time 1 (T1) during the spring semester, and Time 2 (T2) during the fall semester of the following year. A total of 373 youths completed all measures across the three time points ($M_{age}$ = 13.30, *SD* = 1.15, 55.9% females).

## MEASURES

**Repair.** The Repair subscale of the Trait Meta Mood Scale (Fernández-Berrocal, Extremera, & Ramos, 2004) has 7 items related to the belief that one can repair a bad mood. An example item is "Although I am sometimes sad, I mostly have an optimistic outlook". The version used was modified in line with Martin-Albo et al. (2010), with the removal of the item "I have lots of energy when I am happy" (Item 23). Participants' response options ranged from *strongly disagree* = 1 to *strongly agree* = 7.

**Relatedness.** The Relatedness subscale of the Psychological Needs Scale (Gillet et al. 2008; Spanish-language version by León et al., 2011) assesses students' need for relatedness with items such as "I feel appreciated and valued by my colleagues". It has 7 items rated on a Likertscale from ranging *strongly disagree* = 1 to *strongly agree* = 7.

**Peer relationships**. Students were given a list with the names of their classmates to respond to the questions "Who do you like the most?" to assess peer acceptance and "Who do you like the least?" to assess peer rejection. Nominations for both questions were unlimited. The adolescents could choose as many or as few classmates as they wished. The reference group was the classroom, including same- and other-gender peers, but not themselves. Sociometric indexes were calculated using the CIVSoc software (Barrasa & Gil, 2004). The procedure used is identical to that utilized by Zakriski and Coie (1996).

*Peer acceptance.* The software procedure used to calculate an adolescent's peer acceptance score was the number of nominations received divided by the number of students in class minus one. The value ranges from 0 (minimum) to 1 (maximum).

*Peer rejection.* The software procedure used to calculate an adolescent's peer rejection score was the number of nominations of rejection received divided by the number of students in class minus one. The value ranges from 0 (minimum) to 1 (maximum).

**Loneliness.** The Isolation subscale of the UCLA Loneliness Scale Version 3 (Russell, 1996) emerged in most of the facor structure studies of the scale (e.g., Austin, 1983; Dussault, Fernet, Austin, & Leroux, 2009; Hartshore 1993; Hawkley, Browne, & Cacioppo, 2005). As described Dussault et al. (2009), it comprises the first factor of the scale, reflecting feelings of rejection and loneliness with items such as "I feel left out" or "I feel isolated from others". It has 11 items, and similarly to Hartshore's (1993) scale, the original anchors were changed from *strongly disagree* = 1 to *strongly agree* = 7 to avoid confusion with some items. The Spanish version used was validated by Expósito and Moya (1999).

## PROCEDURE

Firstly, we requested permission from the principal of each school to carry out the study. After the principals had agreed to participate, consent from parents and/or guardians was requested, as well as the students' assent to participate in the study. Data collections were carried out during the fall and spring semester of one academic course, and again during the following fall semester (with a 6-month interval between time points) in the students' classrooms at school, during regular classes. The questionnaire used was the same at all three time points. To ensure that there was no bias due to reading difficulties, at least one researcher remained in the room to monitor students' progress and answer any questions. Before completing the questionnaire by computer, we informed the students that all of their answers were confidential and their participation was voluntary.

## STATISTICAL ANALYSIS

A three-time points cross-lagged panel design and structural equation modelling were used to analyze the data with Mplus, Version 7.11. In order to reduce sampling error by reducing the specific variances of each item, parcels were composed. Items were randomly assigned to parcels and then averaged, as strongly recommend in the parceling procedure described by Little, Rhemtulla, Gibson, and Schoemann (2013). In addition, to precisely define the constructs (Little, 2013), a just-identified measurement space was created, and each latent construct was based on 3 parcels.

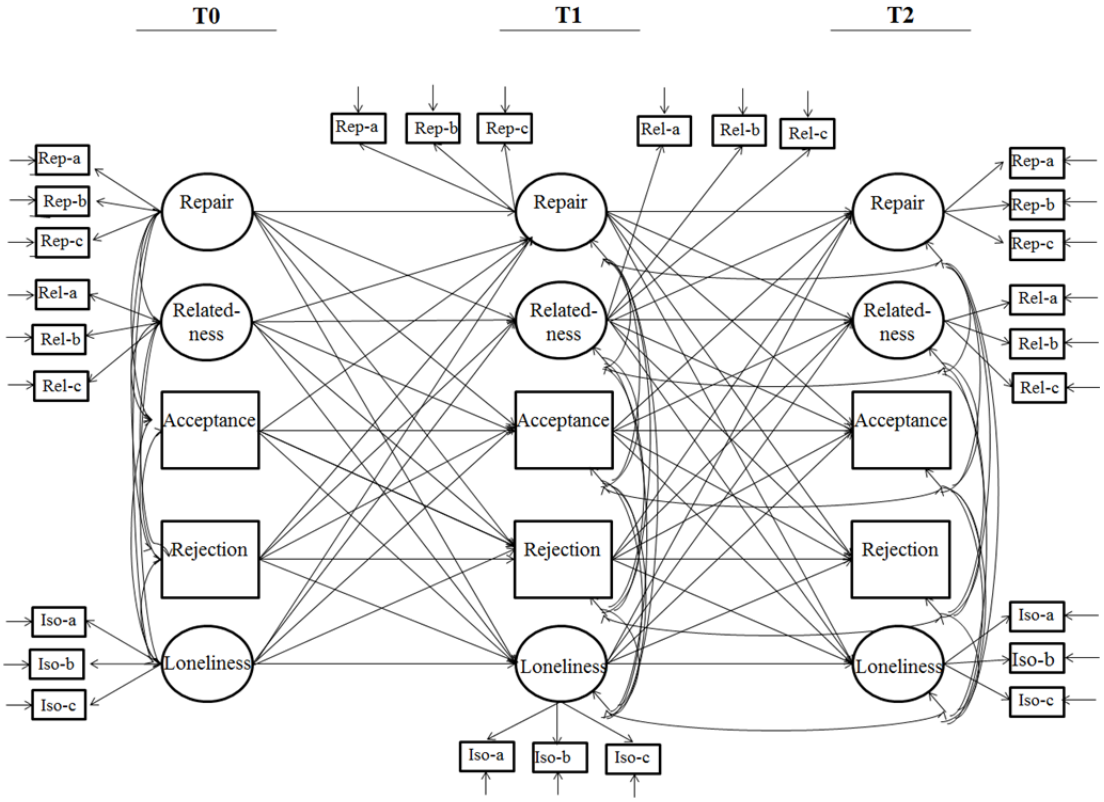
Next, confirmatory factor analyses (CFAs) were conducted to establish longitudinal factorial invariance as a prerequisite to assess the cross-lagged structural model. For this purpose, an unconstrained model was established and hierarchically advanced to more restricted (and nested) models (Little, 2013). The invariance routine started by testing the unconstrained model in which the

pattern of indicator-to-construct is equal across time points (configural invariance). This baseline model was subsequently compared with the next level of measurement invariance, including factor loading equality (weak factorial invariance), equality of the intercepts of the corresponding indicators (strong factorial invariance), and equality of the residual variances of the corresponding indicators (strict factorial invariance). In all tested models, the residuals of the corresponding indicators were allowed to correlate across time points, and the first factor loading per latent variable was set to unity in order to set the scale of the latent variables, as recommended by Little, Preacher, Selig, and Card (2007). A CFI increment larger than 0.01 between nested models indicates a significant change in model fit for testing invariance. Thus, the measurement invariance is accepted when the equality imposed (restriction) implies a decrease in CFI < 0.01 (Cheung & Rensvold, 2002).

Consequently, the fully cross-lagged panel model was tested (see Figure 1). We longitudinally assessed whether repair, relatedness, peer acceptance, and peer rejection influence loneliness among adolescents. Although a three-time points panel design cannot conclusively demonstrate causality (Burkholder & Harlow, 2003), this approach permits us to explore and test key questions about the pattern of autoregressive and cross-lagged relations among the variables over time.

Finally, to test our second aim related to the directional patterns of effects of loneliness, we developed models and compared them with the proposed model of cross-lagged panel. For this purpose, firstly, we developed a structural null model with autoregressive paths and paths that did not include loneliness. Then, based on the structural model, the paths from loneliness to all covariates were added. Comparisons between nested models were performed.

*Figure 1.*Structural model proposed to be tested.




Considering the possible multivariate nonnormality of the measures, the robust maximum likelihood (MLR) estimator was selected for model estimations (Wang & Wang, 2012). This procedure allows us to verify that the estimators were not affected by the lack of normality and, therefore, they were robust (Byrne, 2012). The internal consistency of the instruments employed at each temporal moment was assessed via omega (McDonald, 1999). Omega has been shown to have less risk of reliability overestimation or underestimation (Dunn, Baguley, & Brunsden, 2013), and a more sensitive index of internal consistency, in relation to alpha and also when compared with others (Revelle & Zinbarg, 2009; Zinbarg, Yovel, Revelle, & McDonald, 2006).

Goodness-of-fit was tested with the common fit indexes. Thus, an adequate model fit is considered when the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) have values >0.90, the Root Mean Square Error of

Approximation (RMSEA) is <0.06, and Standardized Root Mean Square Residual (SRMR) is <0.08 (Iacobucci, 2010).

## RESULTS

After the parcelling procedure was conducted, the model to be tested consists of 3 latent variables (each one composed of 3 parcels) and 2 observed variables across three time points. In sum, 9 latent variables (27 parcels) and 6 observed variables were examined. In order to enable replication of the present study, the covariance matrix with the MLR estimation method among indicators and observed variables, as well as factor loadings and omega reliabilities, are presented in Table 1. Omegas ranged between .79 and .89, which is considered acceptable.

### INVARIANCE TESTING

Tests of longitudinal factorial invariance are presented in Table 2. A decrease in CFI <0.01 implies invariance. Thus, according to this criterion, weak, strong, and strict factorial invariance were supported in comparisons across time points. The most parsimonious model with equal residual variances was selected. This implies that the measures have equivalent relationships between the indicators and latent factors across time points (equality of factor loadings), any changes in the mean levels of the indicators are fittingly fallen as changes in the means of the latent variables (equality of intercepts) across measurements, and the sum of the indicator-specific and random sources of measurement error variances for each indicator does not change across time points (equality residual variances of indicators). Consequently, time points can be compared on their scores on the latent variables.

Table 2.

*Longitudinal factorial invariance analysis of the measurement model and test of equality of latent means across time points.*

| Measurement invariance test | $\chi^2$ | df | RMSEA | SRMR | TLI | CFI | ΔCFI | Δmodel |
|---|---|---|---|---|---|---|---|---|
| Configural invariance | 325.433 | 261 | .026 | .039 | .981 | .986 | | |
| Weak factorial invariance | 331.954 | 273 | .024 | .040 | .984 | .987 | –0.001 | 2 vs. 1 |
| Strong factorial invariance | 356.076 | 285 | .026 | .041 | .981 | .985 | –0.002 | 3 vs. 2 |
| Strict factorial invariance | 397.737 | 303 | .029 | .048 | .976 | .980 | 0.005 | 4 vs. 3 |
| Equalíty of latent means across time points test | 1031.709 | 293 | .082 | .828 | .810 | .841 | 0.144 | 5 vs. 3 |

*Note.* $\chi 2$: Chi-square test; df: degrees of freedom; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual; TLI: Tucker-Lewis Index; CFI: Comparative Fit Index; ΔCFI: variations in CFI.

### EQUALITY OF LATENT MEANS TESTING

Once measurement factorial invariance was supported, we conducted a test of equality of latent means across time points by fitting an additional model in which all latent state means were set equal across time. The fit of the model was significantly worse than the strong factorial invariance model without restrictions on the latent means (ΔCFI=0.144). This indicates that the means changed over time points at least between two time points. The latent mean level of repair, relatedness, and loneliness decreased between T0 and T1, and increased between T1 and T2.

Table 1.

*Matrix of covariances and variances (on the diagonal) between parcels and observed variables of the*

| *Matrix* | | Parameters | λ | ω | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 Rep-0a | .83 | | 1,54 | | | | | | | | | | | | |
| | T0 | 2 Rep-0b | .79 | .79 | 1,85 | 1,76 | | | | | | | | | | | |
| | | 3 Rep-0c | .61 | | .77 | .77 | 1,47 | | | | | | | | | | |
| | | 4 Rep-1a | .89 | | .75 | .69 | .44 | 1,66 | | | | | | | | | |
| Repair | T1 | 5 Rep-1b | .86 | .82 | .59 | .68 | .36 | 1,25 | 1,60 | | | | | | | | |
| | | 6 Rep-1c | .68 | | .51 | .54 | .65 | .96 | .99 | 1,69 | | | | | | | |
| | | 7 Rep-2a | .82 | | .56 | .60 | .24 | .74 | .63 | .41 | 1,64 | | | | | | |
| | T2 | 8 Rep-2b | .92 | .84 | .44 | .50 | .24 | .58 | .52 | .38 | 1,20 | 1,55 | | | | | |
| | | 9 Rep-2c | .70 | | .32 | .40 | .45 | .42 | .48 | .50 | .78 | .96 | 1,44 | | | | |
| | | 10 Rel-0a | .79 | | .24 | .18 | .27 | .31 | .21 | .27 | .28 | .23 | .16 | .83 | | | |
| | T0 | 11 Rel-0b | .72 | .88 | .32 | .34 | .33 | .41 | .36 | .37 | .30 | .23 | .17 | .60 | 1,21 | | |
| | | 12 Rel-0c | .75 | | .36 | .42 | .39 | .46 | .35 | .39 | .31 | .22 | .27 | .66 | .68 | 1,44 | |
| | | 13 Rel-1a | .77 | | .25 | .20 | .29 | .56 | .42 | .53 | .37 | .26 | .28 | .38 | .43 | .38 | 1,07 |
| Relatedness | T1 | 14 Rel-1b | .81 | .89 | .33 | .28 | .39 | .60 | .44 | .57 | .37 | .28 | .27 | .47 | .69 | .55 | .79 |
| | | 15 Rel-1c | .81 | | .36 | .30 | .32 | .67 | .50 | .61 | .42 | .26 | .30 | .45 | .54 | .74 | .79 |
| | | 16 Rel-2a | .82 | | .27 | .27 | .29 | .42 | .30 | .36 | .48 | .41 | .32 | .42 | .45 | .42 | .44 |
| | T2 | 17 Rel-2b | .77 | .89 | .41 | .36 | .30 | .41 | .28 | .33 | .50 | .34 | .20 | .42 | .61 | .41 | .38 |
| | | 18 Rel-2c | .81 | | .35 | .33 | .32 | .48 | .35 | .35 | .58 | .43 | .42 | .40 | .46 | .44 | .44 |
| | T0 | 19 Accept | | | .01 | .01 | .01 | .02 | .03 | .02 | .01 | .00 | .01 | .01 | .02 | .02 | .02 |
| Acceptance | T1 | 20 Accept | | | .01 | .01 | .02 | .03 | .02 | .01 | .00 | .01 | .01 | .02 | .03 | .03 | .02 |
| | T2 | 21 Accept | | | .02 | .01 | .02 | .02 | .01 | .01 | .01 | .01 | .01 | .02 | .03 | .02 | .03 |
| | T0 | 22 Rejection | | | -.01 | -.01 | .00 | -.01 | -.01 | .00 | .00 | .00 | .00 | -.01 | -.02 | -.01 | -.01 |
| Rejection | T1 | 23 Rejection | | | -.01 | .00 | -.01 | -.01 | -.01 | -.01 | -.01 | .00 | .00 | -.01 | -.02 | -.01 | -.01 |
| | T2 | 24 Rejection | | | .00 | -.01 | -.01 | -.01 | -.01 | -.01 | -.01 | -.01 | -.01 | -.02 | -.02 | -.02 | -.02 |
| | | 25 Iso-0a | .79 | | -.34 | -.33 | -.23 | -.36 | -.30 | -.32 | -.34 | -.21 | -.20 | -.29 | -.39 | -.58 | -.17 |
| | T0 | 26 Iso-0b | .86 | .87 | -.24 | -.27 | -.20 | -.26 | -.23 | -.25 | -.22 | -.16 | -.14 | -.29 | -.39 | -.47 | -.21 |
| | | 27 Iso-0c | .76 | | -.16 | -.19 | -.17 | -.27 | -.17 | -.22 | -.33 | -.17 | -.16 | -.39 | -.43 | -.54 | -.29 |
| | | 28 Iso-1a | .80 | | -.19 | -.23 | -.19 | -.38 | -.24 | -.33 | -.36 | -.29 | -.19 | -.33 | -.34 | -.51 | -.40 |
| Loneliness | T1 | 29 Iso-1b | .84 | .87 | -.10 | -.17 | -.19 | -.25 | -.22 | -.29 | -.23 | -.20 | -.21 | -.33 | -.43 | -.45 | -.40 |
| | | 30 Iso-1c | .82 | | -.11 | -.17 | -.20 | -.39 | -.28 | -.39 | -.30 | -.19 | -.17 | -.42 | -.52 | -.56 | -.46 |
| | | 31 Iso-2a | .81 | | -.16 | -.17 | -.19 | -.27 | -.26 | -.28 | -.38 | -.27 | -.26 | -.24 | -.32 | -.30 | -.17 |
| | T2 | 32 Iso-2b | .84 | .88 | -.19 | -.19 | -.19 | -.21 | -.21 | -.18 | -.29 | -.24 | -.23 | -.25 | -.31 | -.31 | -.24 |
| | | 33 Iso-2c | .78 | | -.21 | -.22 | -.15 | -.30 | -.22 | -.26 | -.41 | -.24 | -.24 | -.30 | -.36 | -.42 | -.29 |

*Note*. Repair, relatedness, and loneliness are latent variables. Acceptance and rejection are observed variables.

*study, factor loadings and, omega the McDonalls index of internal consistency among parcels.*

| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,41 | | | | | | | | | | | | | | | | | | | |
| .93 | 1,52 | | | | | | | | | | | | | | | | | | |
| .49 | .48 | .99 | | | | | | | | | | | | | | | | | |
| .61 | .49 | .71 | 1,27 | | | | | | | | | | | | | | | | |
| .54 | .58 | .79 | .85 | 1,46 | | | | | | | | | | | | | | | |
| .02 | .02 | .01 | .01 | .02 | .01 | | | | | | | | | | | | | | |
| .03 | .04 | .03 | .02 | .03 | .01 | .02 | | | | | | | | | | | | | |
| .03 | .03 | .03 | .03 | .03 | .01 | .01 | .03 | | | | | | | | | | | | |
| -.01 | -.02 | -.02 | -.02 | -.02 | .00 | .00 | -.01 | .01 | | | | | | | | | | | |
| -.01 | -.02 | -.02 | -.01 | -.02 | .00 | -.01 | -.01 | .01 | .01 | | | | | | | | | | |
| -.03 | -.03 | -.02 | -.02 | -.03 | .00 | -.01 | -.01 | .01 | .01 | .01 | | | | | | | | | |
| -.39 | -.47 | -.32 | -.36 | -.38 | -.03 | -.03 | -.03 | .02 | .02 | .03 | 1,20 | | | | | | | | |
| -.41 | -.43 | -.30 | -.34 | -.33 | -.02 | -.02 | -.02 | .01 | .01 | .02 | .64 | .76 | | | | | | | |
| -.47 | -.45 | -.25 | -.33 | -.33 | -.03 | -.03 | -.03 | .01 | .02 | .02 | .77 | .65 | 1,27 | | | | | | |
| -.56 | -.66 | -.41 | -.37 | -.46 | -.02 | -.04 | -.03 | .01 | .02 | .03 | .72 | .54 | .60 | 1,40 | | | | | |
| -.54 | -.54 | -.39 | -.32 | -.40 | -.03 | -.03 | -.03 | .02 | .02 | .03 | .54 | .52 | .54 | .83 | 1,06 | | | | |
| -.63 | -.67 | -.42 | -.41 | -.47 | -.03 | -.05 | -.04 | .02 | .02 | .03 | .65 | .58 | .87 | .94 | .85 | 1,43 | | | |
| -.30 | -.38 | -.45 | -.47 | -.61 | -.02 | -.02 | -.03 | .02 | .02 | .04 | .59 | .41 | .44 | .62 | .49 | .55 | 1,17 | | |
| -.32 | -.36 | -.42 | -.40 | -.56 | -.02 | -.03 | -.04 | .02 | .02 | .03 | .42 | .38 | .38 | .45 | .47 | .50 | .69 | .87 | |
| -.44 | -.46 | -.45 | -.47 | -.59 | -.02 | -.04 | -.04 | .02 | .02 | .03 | .55 | .47 | .73 | .60 | .53 | .83 | .75 | .67 | 1,21 |

Regarding the sociometric variables, the peer acceptance mean showed an increased pattern over time points (T0–T1 and T1–T2), and the peer rejection mean showed an increase between T0–T1, but between T1 and T2, the measure did not show differences. Descriptive data and correlations are displayed in Table 3. Repair, relatedness, and peer acceptance were negatively related to loneliness across time points. Conversely, peer rejection was positively related to loneliness at each time point. The relation between emotional repair and loneliness across time points displayed a stable pattern with similar correlation values, as did the relation between peer acceptance and loneliness. The pattern of the relation between relatedness and loneliness showed a small increase in the strength of the relation at T2, whereas T0 and T1 had similar correlation values. Moreover, the pattern of the relation between peer rejection and loneliness showed similar correlation values between T0 and T1, and a large increase in the strength of the relation at T2.

### THE CROSS-LAGGED PANEL MODEL

The measurement components of the proposed cross-lagged panel model (structural model) were constrained in accordance with strict factorial invariance. The structural model presented an acceptable fit to the data ($x^2$ = 567.787, $df$ = 431; CFI = .975, TLI = .970, RMSEA = .029, 90% CI [.022, .036], SRMR = .044). All autoregressive regression weights were positive and strong ($\beta$ ranged between .45 and .88, $p$ < .001). Figure 2 shows the structural model.

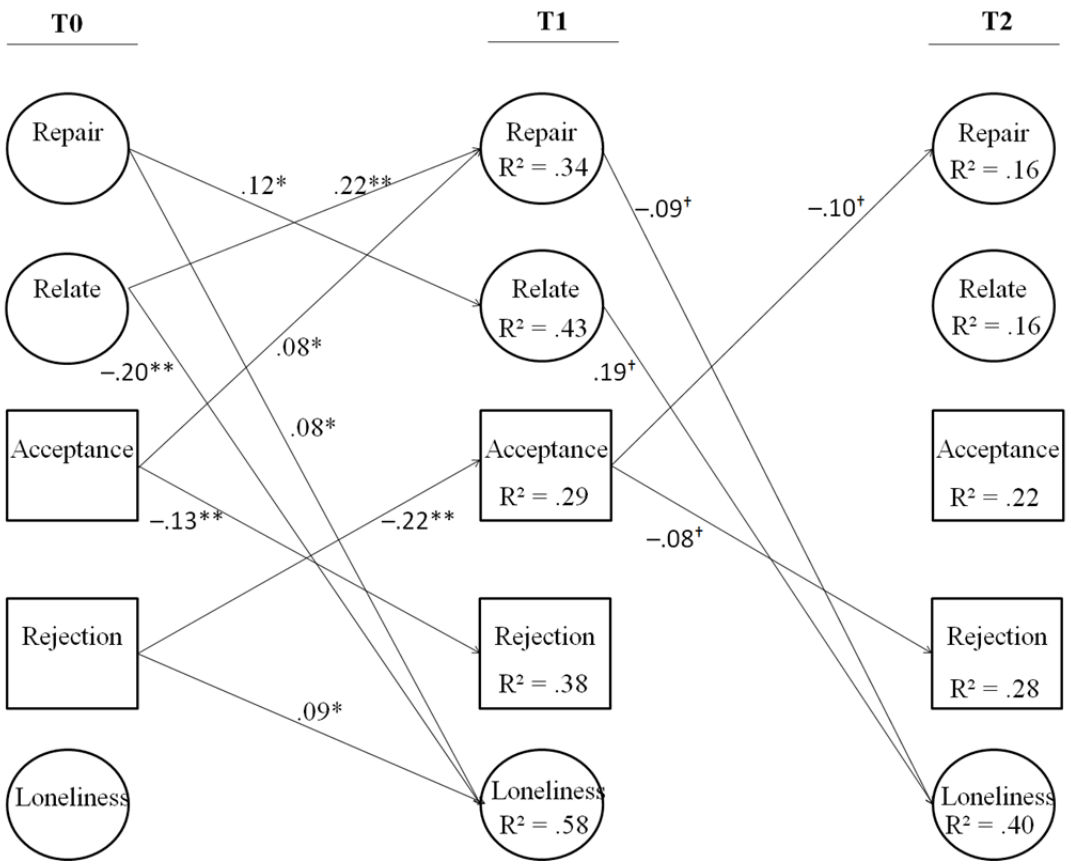
Table 3.

*Means, standard deviations, and correlations among latent and observed variables are presented.*

| | Variables | *M* | *SD* | T0 | | | | | T1 | | | | | | T2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | 1 Repair | 4.60 | 1.05 | – | | | | | | | | | | | | | | |
| | 2 Relatedness | 5.73 | 0.74 | **.37** | – | | | | | | | | | | | | | |
| T0 | 3 Acceptance | 0.20 | 0.12 | .08 | **.21** | – | | | | | | | | | | | | |
| | 4 Rejection | 0.07 | 0.09 | -.08 | **-.16** | **-.33** | – | | | | | | | | | | | |
| | 5 Loneliness | 1.87 | 0.85 | **-.30** | **-.62** | **-.25** | **.18** | – | | | | | | | | | | |
| | 6 Repair | 4.68 | 1.11 | **.54** | **.41** | **.16** | -.06 | **-.30** | – | | | | | | | | | |
| | 7 Relatedness | 5.61 | 0.82 | **.36** | **.62** | **.18** | **-.18** | **-.51** | **.54** | – | | | | | | | | |
| T1 | 8 Acceptance | 0.24 | 0.13 | **.10** | **.23** | **.47** | **-.37** | **-.26** | **.14** | **.24** | – | | | | | | | |
| | 9 Rejection | 0.10 | 0.11 | -.02 | **-.15** | **-.32** | **.60** | **.14** | -.07 | **-.15** | **-.36** | – | | | | | | |
| | 10 Loneliness | 1.95 | 0.97 | **-.19** | **-.57** | **-.22** | **.23** | **.74** | **-.29** | **-.61** | **-.30** | **.19** | – | | | | | |
| | 11 Repair | 4.62 | 1.08 | **.40** | **.28** | **.09** | -.03 | **-.23** | **.49** | **.33** | .03 | -.04 | **-.25** | – | | | | |
| | 12 Relatedness | 5.57 | 0.78 | **.30** | **.61** | **.15** | **-.17** | **-.43** | **.40** | **.58** | **.22** | **-.14** | **-.51** | **.46** | – | | | |
| T2 | 13 Acceptance | 0.32 | 0.16 | .06 | **.18** | **.39** | **-.33** | **-.19** | .07 | **.19** | **.54** | **-.35** | **-.23** | .06 | **.22** | – | | |
| | 14 Rejection | 0.10 | 0.12 | -.05 | **-.20** | **-.21** | **.33** | **.23** | -.09 | **-.22** | **-.29** | **.48** | **.28** | -.08 | **-.23** | **-.46** | – | |
| | 15 Loneliness | 1.89 | 0.87 | **-.16** | **-.45** | **-.20** | **.20** | **.62** | **-.26** | **-.43** | **-.26** | **.19** | **.67** | **-.32** | **-.66** | **-.25** | **.31** | – |

*Note.* Significant correlations are in bold at $p < 0.05$. $N = 373$

*Figure 2.* Standardized parameters examining the relations between repair, relatedness, acceptance, rejection, and loneliness. Covariances, auto-regressive, and non-significant paths in the structural model are omitted for presentation clarity.




$^{**}p < .01$, $^{*}p < .05$, $^{\dagger}p < .10$.

## COMPARING MODELS

To test our second aim, comparisons between models were needed. Firstly, a structural null model was developed with auto-regressive paths and paths that did not include loneliness ($x^2$ = 584.076, *df* = 439; CFI = .974, TLI = .969, RMSEA = .030, 90% CI [.023, .036], SRMR = .049). Based on the null model, the relations from loneliness at T0 to any covariates at T1 and from T1 to T2 were added to the model ($x^2$ = 721.130, *df* = 436; CFI = .949, TLI = .938, RMSEA = .042, 90% CI [.036,.047], SRMR = .077). Then, the resulting model was

compared with the structural null model. Results indicated that the resulting model was significantly worse than the structural null model (ΔCFI=0.025). In addition, the proposed structural model, in which loneliness was the dependent variable, was compared with the structural null model (ΔCFI=0.001) and with the resulting model (ΔCFI=0.026). These results supported our hypothesis, suggesting that loneliness acts as dependent variable.

## DISCUSSION

The aim of the present study was to explore a model to determine whether emotional regulation, motivational need of relatedness, and peer relations influence loneliness among adolescents across three time points. The results showed the influence of repair, relatedness, and peer rejection on loneliness. In turn, loneliness was found to act as the dependent variable within the proposed model. To our knowledge, this is the first longitudinal study on the relations between these variables in which they were measured across more than two data time points.

Our first hypothesis (a) was partially confirmed: Peer rejection at T0 was a predictor of loneliness at T1. This result is in line with previous longitudinal studies (Betts & Stiller, 2014; Heinrich & Gullone, 2006), and the notion that a poor social situation within one's peer group, as defined by rejection, influences prospective feelings of loneliness. Nevertheless, our model found no significant associations between peer rejection measured at the end of the academic course (T1) and loneliness measured at the beginning at the next course (T2). When examining the mean differences of loneliness across time points, the mean of loneliness was higher at T1 than at T0 and T2, denoting an increment of loneliness at the end of the academic course, and a resetting of loneliness values at the beginning of the course, starting the course with similar values to those of T1 of the past year.. Although correlation analysis showed that the

highest relation between peer rejection and loneliness was produced at T2, these results seem to suggest that individuals who were previously rejected carried their loneliness feelings to the next academic course, whereas loneliness without experiencing rejection could return to the original levels.

Peer rejection is relatively stable, as pointed out by Sandstrom and Coie (1999): some initially rejected individuals who are aware of their social status may improve their situation in the group, while other individuals remain rejected over time.

The associations of peer acceptance at T0 with future loneliness, and of peer acceptance at T1 with loneliness at T2 were nonsignificant, contradicting our second hypothesis (b). The vast research predicting loneliness from peer acceptance has been cross-sectional and has focused on analyzing constructs from one perspective: social, developmental, motivational, or other frames (Gorman, Schwartz, Nakamoto, & Mayeux, 2011; Mouratidis & Sideridis, 2009; Vanhalst, Luyckx, & Goossens, 2014; Woodhouse, Dykas, & Cassidy, 2011). Therefore, it cannot be compared with our prospective results and may differ from our integrative perspective. Moreover, if we contrast our correlation results with the cross-sectional research (e.g., Vanhalst, Luyckx, & Goossens, 2014), the size and the direction of our results are in line with the negative relation found between peer acceptance and loneliness. To our knowledge, this is the first study that introduces peer relationhips indicators, relatedness need, and emotional repair into the prediction of loneliness. Peer acceptance may have been undermined by the motivational or emotional influences presented in our study.

As expected (hypotheses c and d), we found support for the notion that relatedness and repair influence subsequent loneliness across time points. In addition, our results showed a mutual influence between relatedness and repair

(hypothesis e). Considering these findings conjointly, two mechanisms to deal with loneliness emerged. The first one: At the beginning of a course (T0), high relatedness influenced a decrease in feelings of loneliness (T1) and increased repair (T1), which, in turn, influenced a further decrease in loneliness (T2). In other words, a satisfied relatedness need prospectively produced fewer feelings of loneliness by regulating one's emotions, which, in turn, decreased future loneliness, supporting the research conducted by Martin-Albo et al. (2015). Furthermore, our results also add to the mechanism through which initial peer acceptance influenced prospective repair at the end of the academic course, probably by maintaining a positive situation within the peer group, and thus, influenced a decrease in loneliness measured in the next course. This mechanism revealed that satisfied relatedness need, together with a positive social status, led to fewer future feelings of loneliness through the regulation of emotions. An adolescent whose need of relatedness is satisfied and who is accepted within the peer group will influence repair, and will thus have decreased loneliness feelings. The second mechanism displayed in the cross lagged panel model refers to adolescents with high emotion regulation. High levels of repair (T0) influenced prospective feelings of loneliness (T1) and a prospective unmet need of relatedness (T1) which, in turn, influenced subsequent loneliness feelings (T2). This second mechanism constitutes a risk for experiencing loneliness during adolescence. Adolescents who worried about social relationships and who, at the beginning of the school course, activated emotional repair, observed how this produced more feelings of loneliness and an unsatisfied need of relatedness which, in turn, implied more feelings of loneliness. Adolescents with initially high emotional repair would experience more feelings of loneliness and greater dissatisfaction of relatedness, and thus, would experience an increase in loneliness.

The cross-lagged panel design of three time points allowed us to examine the direction of the patterns of loneliness in the model. By comparing models (hypothesis f), loneliness has been shown to better fit the data as consequent rather than as antecedent of peer relations, repair, and relatedness, supporting our hypothesis. This result is in line with previous research that has established feelings of loneliness as a consequence of peer experience, individuals' emotions, and motivations, respectively (Cheng & Furnham, 2002; Gest, Domitrovich, & Welsh, 2005; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2005; Mouratidis & Sideridis, 2009; Thompson et al., 2007; Zysberg, 2012).

This is the first study that integrates social relationship indicators and motivational and emotional variables, traditionally investigated separately, to predict feelings of loneliness among adolescents. The resulting model showed that adolescents deal with loneliness in different ways depending on their emotion regulation abilities, relatedness need satisfaction, and social situation within the peer group. Concretely, our data found that adolescents with an initial positive social status or satisfied relatedness need activated emotion regulation, which produced a decrease in future feelings of loneliness. Relatedness itself produced a reduction in loneliness. However, adolescents who initially active emotional repair increased their feelings of loneliness and experienced unsatisfied relatedness need, which implied prospective feelings of loneliness. In addition, peer relationship indicators showed an influence on loneliness. In particular, rejection by the peer group directly influenced future feelings of loneliness, whereas acceptance reflected a prospective activation of emotional repair, and thus, fewer feelings of loneliness. When examining the transition between courses, acceptance at the end of a school year implies a lower prospective level of emotional repair, which has been shown to be a protective factor against loneliness.

On basis of the present results, specific interventions focused on increasing social contacts and opportunities for social reconnection with others could reduce feelings of loneliness among adolescents. Qualter (2003) suggested that increasing the opportunities to interact with others, teaching social skills to those who are unable to reconnect or who have social difficulties would enable them to be more successful in their peer interactions. However, in order to achieve an effective loneliness intervention program, is also important to help the individuals to overcome their own needs, expressed as thoughts and ideas. Given the harmful consequences of loneliness in adolescence (Cacioppo et al., 2002; Heinrich & Gullone, 2006; Qualter et al., 2015; Vanhalst, Luyckx, & Goossens, 2014) and in light of the present results, effective and appropriate interventions to prevent rejection and to improve social interactions opportunities may yield less loneliness.

### LIMITATIONS

The findings described above should be considered with regard to the following limitations: First, we collected data at the beginning and at the end of an academic course and again at the beginning of the next course. This only represents a single advance in time data collection. Thus, our results cannot be compared to other course transitions or even be generalized. Further longitudinal research is warranted. Second, the sample size was not very large and was made up of Spanish adolescents, restricting the generalizability of the findings to other cultures, at least until other investigations reproduce the current results. A third limitation worth considering is that, based on the longitudinal nature of our study and the several measures used, parcels have been developed. Despite the fact that we considered all the recommendations in the parcelling methodology used (Little, Rhemtulla, Gibson, & Schoemann, 2013), we did not model as closely to the collected data as possible, and thus some kind of contamination may have occurred (Little, Cunningham, Shahar, &

Widaman, 2002). Finally, except for peer relationships, all the data were collected using self-report instruments, which may lead to a common method bias.

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# CONCLUSIONES GENERALES

El estudio de las relaciones sociales y las implicaciones académicas y psicológicas en la población adolescente turolense ha generado las siguientes conclusiones:

- Las relaciones sociales positivas medidas como aceptación social y amistad están relacionadas positivamente con el rendimiento académico actual y futuro.

- La aceptación social predice el rendimiento académico actual y futuro, sin embargo esta relación depende de la edad durante la adolescencia. La influencia de la aceptación social sobre el rendimiento académico actual o futuro es mayor al comienzo de la adolescencia que en la etapa intermedia.

- El rendimiento académico ha mostrado ser una consecuencia de las relaciones sociales y no un precursor.

- Las diferentes formas existentes de medir el grado de ajuste entre percepción de aceptación y aceptación social subyacen a diferentes procesos en la adolescencia.

- La percepción de aceptación y el rendimiento académico se relacionan a través del grado de ajuste entre percepción de aceptación y aceptación social de forma transveral y longitudinal solo a través de las medidas de *status realism* y *bias by the subtraction method.*

- Las relaciones sociales medidas como aceptación y rechazo, la necesidad de relaciones y la reparación emocional influyen en la soledad de los adolescentes. Dos mecanismos se han encontrado:

Por un lado, una alta necesidad de relaciones influye negativamente sobre futuros sentimientos de soledad y a su vez produce un aumento de los niveles de reparación emocional que hace decrecer futuros sentimientos de soledad. La aceptación social tiene un papel amortiguador sobre la aparición de soledad por medio de la influencia positiva sobre la regulación emocional que hace decrecer futuros niveles de soledad.

Por otro lado, altos niveles de regulación emocional influyen haciendo que aumente la soledad y la necesidad de relaciones, que a su vez hacen incrementar los sentimientos de soledad futura. El rechazo social influye directamente aumentando actuales y futuros sentimientos de soledad y en decremento de la aceptación social.

- La soledad ha mostrado ser una consecuencia de las relaciones sociales, la necesidad de relaciones y la reparación emocional, no un precursor.

# IMPLICACIONES

Los resultados encontrados en la presente tesis sobre el estudio de las relaciones sociales en la población adolescente turolense han generado una serie de implicaciones prácticas:

- Las relaciones sociales entre iguales han mostrado tener una relación con el rendimiento académico de los adolescentes. En concreto, el rendimiento académico de un individuo puede verse incrementado por el grado de aceptación del individuo en el grupo, siendo esta la dirección de la relación. Estos resultados sugieren que una mejora en las relaciones sociales de los integrantes de un grupo posiblemente llevará asociada una mejora del rendimiento académico de los integrantes del grupo. Programas de intervención específicos en la mejora de la aceptación social de los miembros de un grupo son todavía desconocidos en su totalidad, pero podemos aportar determinadas características efectivas para su implementación.

- A la luz de nuestros resultados, los centros educativos pueden mejorar el rendimiento académico de sus estudiantes por medio del diseño e implementación de programas de intervención destinados a favorecer las relaciones sociales en clase. Ciertas características para el diseño de programas de intervención efectivos se desprenden de nuestra investigación:

    La mejora de las relaciones sociales de los miembros de un grupo, es un concepto amplio, que no tiene porque llevar asociada una mejora en el rendimiento académico. Los resultados han mostrado que es la mejora específicamente de la aceptación social de los integrantes en el grupo lo que lleva

asociada una mejora en el rendimiento académico. El diseño de programas de intervención debería ser específico en la mejora de la aceptación social de los integrantes de un grupo.

La influencia de la aceptación social durante la etapa de la adolescencia sobre el rendimiento académico ha mostrado ser desigual. La edad juega un papel muy importante en la influencia de la aceptación social. Concretamente, los resultados han mostrado que la aceptación social tiene una mayor influencia sobre el rendimiento académico al comienzo de la adolescencia. El diseño y la implementación de programas de intervención dirigidos a la mejora de la aceptación social de los integrantes de un grupo deberían estar orientados especialmente hacia adolescentes al comienzo de su etapa del desarrollo para conseguir mejores resultados.

Las relaciones sociales que se establecen en el grupo de iguales no son igualmente percibidas por todos sus miembros. Nuestros resultados han mostrado que los adolescentes infravaloran y sobrevaloran sus percepciones de aceptación social en el grupo. Las herramientas hasta ahora utilizadas indistintamente para el cálculo de la precisión entre percepciones y realidad del grupo, han mostrado medir distintos procesos. A la luz de nuestros resultados, en el diseño de programas de intervención dirigidos a mejorar la aceptación social de los integrantes de un grupo, deberían ser tenidas en cuenta las diferencias individuales de infravaloración o sobrevaloración de los integrantes del grupo. Sin embargo, no todas las herramientas son adecuadas, realismo de estatus y sesgo mediante el método de resta (status realism y bias by the subtraction method) han mostrado ser fiables y

estables en su relación mediadora entre percepción de aceptación y rendimiento académico de los adolescentes. Por ello, desde esta investigación se recomienda su uso para la medición del grado de ajuste entre percepción de aceptación y aceptación social de un individuo. Y especialmente para el diseño de programas de intervención en aceptación social de los integrantes de un grupo.

- Las relaciones sociales entre iguales han mostrado ser muy importantes en la aparición de sentimientos de soledad en los adolescentes. Así mismo, la necesidad de relaciones y la reparación emocional han mostrado influir sobre la soledad. Estos resultados son muy relevantes para el diseño e implementación de programas de intervención para favorecer el decremento de los sentimientos de soledad en adolescentes. Concretamente dos caminos con efectos contrapuestos, disminuir vs aumentar los sentimientos de soledad se han encontrado como fundamentales en la presente investigación. No solo las relaciones sociales, entendidas en este estudio como aceptación social, sino también la combinación de una reparación emocional óptima y una necesidad de relaciones adecuada producen una disminución de la soledad en adolescentes. Por otro lado, las relaciones sociales negativas, vistas como rechazo social, una necesidad de relaciones alta y una regulación emocional alta hacen aumentar los sentimientos de soledad en adolescentes. A la luz de estos resultados, el diseño e implementación de programas de intervención dirigidos a disminuir la soledad de adolescentes debería de tener en cuenta no solo las relaciones sociales actuales en el grupo, sino también la necesidad individual de relaciones de los integrantes del grupo así como su reparación emocional.

## LIMITACIONES

A lo largo de los estudios una serie de limitaciones generales merecen ser consideradas:

En primer lugar, la muestra utilizada en los estudios llevados a cabo en la presente tesis pertenece en exclusiva a la provincia de Teruel, por lo que los resultados encontrados no son generalizables a la población adolescente.

En segundo lugar, la recogida de datos se realizó dos veces en un mismo curso académico y otra vez al comienzo del siguiente curso académico, con un intervalo de 6 meses entre tomas de datos. Esto representa información únicamente de dos cursos académicos y la consiguiente pérdida de sujetos debido a cambios de clases y/o cambios de centro educativo.

En tercer lugar, los resultados de la presente tesis no se han utilizado para diseñar, aplicar y evaluar un programa de intervención basado en las relaciones sociales para la mejora del rendimiento académico y la soledad en adolescentes.

Por último, tradicionalmente las relaciones sociales han sido medidas mediante el sociograma, sin embargo existen otros métodos basados en cuestionarios o en técnicas de observación. En la presente tesis todas las medidas de relaciones sociales utilizadas han sido obtenidas únicamente mediante índices sociométricos, por lo que la generalización de los resultados y/o su comparación con otros estudios es limitada.

## PROSPECTIVAS

Las relaciones sociales entre iguales han mostrado ser un aspecto fundamental en el desarrollo psicológico y social de los adolescentes. Desde esta investigación se han intentado abarcar implicaciones académicas y psicológicas de las relaciones sociales positivas y negativas en los adolescentes. Sin embargo, los procesos grupales son muy amplios y complejos, por lo que se abren diferentes posibilidades de trabajo y líneas de investigación futuras:

En primer lugar, utilizar muestras que permitan la generalización de resultados a la población adolescente, así como el desarrollo de estudios en distintas culturas que permitan examinar las características propias de la etapa adolescente y las características propias de la cultura.

En segundo lugar, ampliar la realización de estudios de corte longitudinal que permitan examinar la estabilidad y el cambio de los procesos subyacentes a las relaciones sociales en los adolescentes.

En tercer lugar, diseñar, desarrollar y evaluar propuestas de intervención a partir de los resultados obtenidos en la presente tesis que favorezcan en base a una mejora de las relaciones sociales en los adolescentes, mejores resultados académicos y prevengan situaciones de soledad.

En cuarto lugar, realizar estudios comparativos de las distintas metodologías existentes para medir las relaciones sociales en los adolescentes y unificar metodologías que permitan la comparación y generalización de resultados.

## RESUMEN

Las relaciones entre iguales son especialmente importantes durante la adolescencia. En la presente tesis se ha evaluado cómo las relaciones sociales positivas medidas como aceptación social y amistad influyen en el rendimiento académico a lo largo de la adolescencia. Se ha examinado la relación entre percepción de aceptación y rendimiento académico y propuesto un modelo mediacional a través del grado de ajuste entre percepción y realidad de los adolescentes. Además, desde una perspectiva integradora, se ha investigado el papel de las relaciones sociales (medidas como aceptación y rechazo social), la necesidad básica de relaciones y la reparación emocional en la aparición y mantenimiento de la soledad. La muestra consiste en un total de 373 adolescentes de entre 11 y 16 años que participaron en tres tomas de datos a lo largo de dos cursos académicos con un intervalo de seis meses. Los resultados de los análisis de regresión transversal y longitudinal mostraron un efecto moderador de la edad en la relación entre aceptación social y rendimiento académico. Los resultados de los modelos mediacionales propuestos entre percepción de aceptación y rendimiento académico a través del grado de ajuste entre percepción y realidad resultaron significativos y consistentes de forma transversal y longitudinal. Los resultados de un diseño de panel longitudinal de tres tiempos mostraron dos mecanismos diferentes de la influencia de aceptación social, rechazo social, necesidad de relaciones y reparación emocional sobre la soledad. Para concluir, se desprenden implicaciones académicas y psicológicas de las relaciones sociales analizadas durante la adolescencia.

## ABSTRACT

Peer relationships are especially important during adolescence. This doctoral thesis examined the role of peer relationships measured as peer acceptance and friendship on academic achievement during adolescence. Investigated the relation between perception of acceptance and academic achievement and proposed a mediational model in which the degree of correspondence of self-other perceptions of acceptance is mediating the relation between self-perception of acceptance and academic achievement. Moreover, from an integrative perspective, this thesis examined whether emotional repair, relatedness need, and indicators of peer relations influenced loneliness longitudinally among adolescents. The sample consisted of 373 adolescents aged 11 to 16 years old. Data collection was carried out across three time points with a six month interval. The results of the regression analyses showed that the relation between peer acceptance and academic achievement is moderated by age, cross-sectional and longitudinally. The mediation models in which the degree of correspondence of self-other perceptions of acceptance is mediating the relation between self-perception of acceptance and academic achievement were significant and presented consistency longitudinally. Results of a cross-lagged panel design with three time points showed different paths of influence of peer acceptance, peer rejection, relatedness, and emotional repair on loneliness. Academic and psychological implications regarding peer relationships have been found.

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