



Loneliness Profiles in Adolescence: Associations with Sex and Social Adjustment to the Peer Group

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Abstract

Loneliness is a complex feeling associated with socio-emotional adjustment difficulties, particularly during adolescence. Such construct is often treated as unidimensional rather than multidimensional, moreover, studies consisting of both peer and family contexts, are very scarce. Adopting a multidimensional and person-centered approach, our study aimed to identify distinct clusters of adolescents with similar patterns of social and emotional loneliness with peers and family and to examine their differences in peer reported social adjustment, controlling for sex. Self-report and peer nomination data were collected from 691 participants (48.36% boys) aged between 11 and 16 years ($M = 12.95$, $SD = 1.15$). After controlling for age and preference for solitude, results revealed four clusters with specific configurations of loneliness forms and with different associations with positive or negative features of social adjustment to peer group. Two clusters exhibited adaptive profiles (lower vulnerability to maladjustment): *less-lonely*, and *family-related loneliness* profile, in which adolescents were viewed by peers as exhibiting more prosocial behaviors. The other two clusters displayed maladaptive profiles (higher vulnerability to maladjustment): *more-lonely*, and *peer-related loneliness* profile, in which adolescents were more likely viewed by their peers as socially withdrawn, peer-excluded, and peer-victimized. Additionally, our results revealed sex differences, with girls in the *more-lonely profile* showing significant higher social loneliness related to peer group, and higher social and emotional loneliness in family context. Our results highlight the importance of recognizing different forms of loneliness given the differences in adjustment to social contexts observed, shedding further light on this complex construct.

Keywords Social loneliness · Emotional loneliness · Cluster analysis · Peer exclusion · Peer victimization

Highlights

- We investigated the existence of different groups of adolescents who experienced different forms of loneliness (social and emotional, within peers and family context).
- We analyzed the different loneliness profiles and their association with social adjustment difficulties to peer group and sex.
- Our results revealed four loneliness profiles among adolescents, with different vulnerability to social adjustment difficulties, which were the more-lonely profile, peer-related loneliness profile, family-related loneliness profile, and the less-lonely profile.
- Sex differences were also found. Girls who share the more-lonely profile showed higher social loneliness in peer group context, and higher social and emotional loneliness in the family group.
- These results highlight the importance of recognizing different forms of loneliness to prevent and reduced the risk of developmental adjustment difficulties.

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Introduction

Loneliness is an unpleasant and subjective feeling (Peplau & Perlman, 1982) that is related to the amount of social contact (quantity), and also to features that define social relationships (quality), such as intimacy and trust.

Particularly during adolescence, loneliness may be a vulnerability factor when it comes to establishing positive relationships (e.g., Rubin et al., 2008) and, consequently, may have an impact on individuals' social and emotional development, as well as on their general well-being (Larsgaard et al., 2016). A clear understanding of this complex construct, considering the different forms that loneliness may take, and their associations with sex and adjustment difficulties is needed to prepare more accurate interventions in order to prevent and reduce the risk of developmental maladjustment.

Loneliness and Adolescence

Adolescence is the developmental period when interactions and relationships with peers become increasingly more important (Qualter et al., 2015; Rubin et al., 2009) and belonging to a peer group becomes a subject of major concern (Rubin et al., 2008). At the same time, it is a period of increased risk for the occurrence of feelings of loneliness (Heinrich & Gullone, 2006; Majorano et al., 2015). Adolescents must cope with significant changes in social expectations and relationships that may make them more vulnerable to experiencing loneliness (Rubin et al., 2008). They are faced with conflicting developmental challenges that include (a) establishing new social networks and closer relationships with peers; (b) reducing their dependence on the family, but at same time feeling supported by them; and (c) emerging as a separate self through autonomy, individuality, and identity formation (Majorano et al., 2015; Musetti et al., 2012). During this developmental period, being alone and preferring solitary activities may, to some extent, be regarded as normative, thus providing opportunities for self-reflection and identity work (Goossens & Marcoen, 1999; Qualter et al., 2015). However, spending much time alone may lead to missing many opportunities to interact with peers, which places youths at risk for maladaptive developmental pathways (Wang et al., 2013). The development of positive and satisfactory peer relationships and the formation of friendships are crucial in helping adolescents accomplish developmental tasks such as forming their identity, developing social-cognitive skills and self-esteem, and establishing autonomy (see Rubin et al., 2015, for a review).

It has been shown in previous studies that loneliness is associated with the difficulties that adolescents experience with peer relationships (Cassidy & Asher, 1992; Vanhalst et al., 2014; Woodhouse et al., 2012). For example, a strong and stable correlation between shyness and loneliness was found, with shyness being a predictor of loneliness at various ages (Mahon et al., 2006; Vanhalst et al., 2014). Using peer nomination procedures, Woodhouse and colleagues

(2012) also found that adolescents' loneliness was associated with lower peer acceptance, greater likelihood of being victimized, and higher levels of shyness/social withdrawal. Moreover, persistent and chronic loneliness among young people has been found to be a significant risk factor for psychopathology, depression, suicidal feelings, and inadequate social skills (see Heinrich & Gullone, 2006). Although the links between loneliness and social adjustment are well-established, there are still gaps and inconsistent findings due to multiple factors such as the way loneliness is measured (single-item vs. multiple-items scale), the conceptualization of the construct (uni- vs. multi-dimensional), and the way individuals are classified as lonely (e.g., cut-off score).

Although loneliness is a complex construct, it is often treated as an unidimensional one, under the assumption that it takes the same form across distinct situations and relationships (Hyland et al., 2019). However, deficits in social relationships may result from differences in the quantity and/or quality of these relationships. In order to capture the multidimensionality of loneliness, and according with the social needs' perspective, Weiss (1973) proposed a distinction between social and emotional loneliness. The social form of loneliness is associated with lack of social engagement and integration in social networks that may offer a sense of connection to others. On the other hand, the emotional form of loneliness is associated with the absence of a satisfactory close relationship and refers to a lack of intimacy that may provide a sense of share and trust. Moreover, different social relationships, such as peers and family, may offer distinct social provisions, and have also different social functions (Weiss, 1973). Several researchers have provided strong evidence for the multidimensionality of loneliness (e.g., De Jong Gierveld & Van Tilburg, 2010; Goossens and Beyers, 2002; Goossens et al., 2009; Maes et al., 2015; Ribeiro et al., 2019), contributing to a more comprehensive understanding of this phenomenon. A multidimensional approach to loneliness seems to offer a more differentiated perspective of this complex construct (Heinrich & Gullone, 2006; Maes et al., 2016).

Furthermore, most of what we know about adolescents' loneliness is based on variable-centered studies, which are designed to describe mean differences or compare lower versus higher loneliness scores that classify loneliness by a predetermined cut-off point (Hyland et al., 2019). A person-centered approach, however, seeks to identify individuals who resemble each other and who differ from other groups of individuals (Howard & Hoffman, 2017). It is particularly useful in identifying youths' homogeneous subgroups who share the same salient configurations on the different forms of loneliness, recognizing that distinct forms of loneliness may naturally co-occur. This approach makes the adolescents the focus of the analysis, allowing insight into how

psychological constructs, such as loneliness, are manifested within individuals.

Only few studies have explored this construct using a person-centered approach (Maes et al., 2016), and most were conducted with middle-aged and older adults (Hyland et al., 2019; Shevlin et al., 2014). So far, the scarce studies available, either with cross-sectional (Maes et al., 2016) or longitudinal designs (Hutten et al., 2021; Vanhalst et al., 2014), have focused only on peer- or parent-related loneliness, or both. Although these studies have found meaningful clusters in samples of youths, they did not consider relationship quality or quantity (social and emotional loneliness) in the two social contexts of interest. It is relevant to consider the different sources of loneliness, which may differ across the lifespan, but it is also crucial to consider whether such relationships, either with family or with peers, can satisfy, or fail to satisfy, social and emotional needs (thus leading to social or emotional loneliness).

The Influence of Adolescents' Sex and Age

According to previous research, interpersonal relationships may differ depending on sex (e.g., Rose & Rudolph, 2006). In line with this perspective, it is reasonable to theorize that sex differences may vary depending on the different forms of loneliness, but also according to specific relationships (peers and family). However, whether or not sex differences do exist remains unclear, because the results of previous studies are contradictory and there are inconsistencies in the literature that supports this notion (Weeks & Asher, 2012). Some researchers claim that girls report more loneliness, while others claim that it is the boys who feel lonelier, and still there are others reporting no sex differences on loneliness. Despite this controversy, only few studies have analyzed sex differences in a relationship-specific type of loneliness (Maes et al., 2019). Age differences have also been investigated in prior studies (Luhmann & Hawkey, 2016), again finding inconsistent results. Mahon et al. (2006) conducted a meta-analysis of 95 studies of adolescent loneliness and revealed a large effect size for the link between loneliness and sex and a very low effect size for the association between loneliness and age. Since empirical studies have not yet achieved consensus regarding the influence of sex and age on loneliness, future research needs to take into account these variables.

The Present Study

Although the knowledge base on loneliness in adolescence is expanding, still only few studies adopt a multidimensional and person-centered approach, considering

simultaneously the different forms of loneliness (emotional and social loneliness) and their source (peers- and family-related, the two major socialization contexts). To the best of our knowledge, no previous research has examined loneliness in this manner during adolescence.

Building on the gaps and inconsistent results found in literature, our study adopted a multidimensional and person-centered approach. Our purpose was to identify groups of adolescents with similar patterns of social and emotional loneliness scores (through lack of integration and intimacy) related to the two major agents of youths' socialization (their peers and their family). Social and emotional loneliness, as well as family- and peer-related loneliness, may all be present to a certain extent in every individual. Our purpose was to investigate whether there were groups of adolescents who experience one form of loneliness but not another, and within one social context but not within another. Preference for solitude was used as a covariate because it has been associated with loneliness and with having fewer intimate friends (Liu et al., 2014), which in turn predicts relationship difficulties with peers (Bowker & Raja, 2011). Additionally, we examined sex-specific differences, which may be crucial for identifying heterogeneity between boys and girls given that sex differences in the prevalence of each form of loneliness have been reported. Finally, we analyzed how the distinct profiles of loneliness might be differentially associated with positive and negative features of social adjustment to the peer group. We adopted a multi-informant approach that is multidimensional peer nominations. For a better understanding of social behavior and functioning of lonely adolescents, studies using multi-informants' approach are needed, because it considers the multiple dimensions, both positive and negative, of adolescents' social behaviors. Such assessments take into account the perspectives of various observers, and peers are privileged informants of the interactions and relationships within the group of those being evaluated.

In sum, the main goals of our study were as follows: (1) to investigate whether distinct profiles of loneliness could be identified in a sample of Portuguese adolescents aged 11–16 years; (2) to characterize them in terms of different forms of loneliness (emotional and social) within the two major contexts of socialization (family and peers), controlling for age and preference for solitude; (3) to examine how each loneliness profile was associated with different dimensions of social adjustment to peer group, again controlling for age and preference for solitude; and finally, (4) to consider the effect of sex. We expected to find groups of adolescents with different configurations of social and emotional loneliness. Specifically, we expected some adolescents to report no integration or intimacy difficulties in either peer or family contexts, as opposed to others whom we expected to report integration or intimacy difficulties in

both social contexts. In accordance with previous studies (e.g., Majorano et al., 2015) that showed adolescents' decreasing dependence on the family and increasing autonomy linked to identity construction, we further anticipated that, some adolescents would exhibit similar difficulties in integration and intimacy within their family, and others still, within the peer context. We hypothesized that these different profiles of loneliness would reveal specific links with positive or negative features of social adjustment. Finally, given the inconsistent findings in the literature regarding sex, we had no particular expectation regarding the effect of this variable.

Method

Participants

A total of 691 participants (334 boys; 48.36%), aged between 11 and 16 years ($M = 12.95$, $SD = 1.15$), were recruited from three Portuguese public junior-high schools (grades 7 through 9) in the Lisbon metropolitan area. The sample comprised 633 (91.6%) seventh-grade students, 34 (4.9%) eighth-grade students, and 24 (3.5%) ninth-grade students. The mean age of the seventh-, eighth-, and ninth-grade groups was 12.80 ($SD = 1.04$), 14.15 ($SD = 0.96$), and 15.21 ($SD = 0.83$) years, respectively.

Procedure

Approval from the school authorities, as well as written informed consent and assent from all participating families and young adolescents were obtained. Data were then collected, in regular school hours, in class, during a single 45-minute session. A research assistant was always present to introduce the study and to answer any questions. Participants were informed that there were no right, or wrong answers and all instructions emphasized the confidentiality of the data and the voluntary nature of participation. Personal data collection and processing were carried out in accordance with recommendations of APA Ethical Guidelines, in compliance with the Declaration of Helsinki, ensuring the privacy and confidentiality of participants' information. The assessment protocol was also approved by the University Ethical Committee.

Measures

Self-Reported Loneliness

Loneliness was measured with a Portuguese version (Ribeiro et al., 2019) of the Relational Provision Loneliness Questionnaire (RPLQ; Hayden-Thomson, 1989). This 28-

item self-report instrument assesses subjective feelings of loneliness through two aspects of social satisfaction (group integration and personal intimacy) experienced in two different social contexts: peer group and family. This multidimensional measure comprises four subscales of seven items each: (1) peer-group integration, which assesses to what extent respondents feel accepted by their peers (e.g., "I feel in tune with other young people"); (2) peer-personal intimacy, which assesses whether respondents have a friend with whom they share their feelings and thoughts (e.g., "I have a friend I can tell everything to"); (3) family-group integration, which assesses to what extent respondents feel integrated into their family (e.g., "I feel that I usually fit in with my family"); and, (4) family-personal intimacy, which assesses whether respondents have a family member with whom they can share their thoughts and feelings (e.g., "I have someone in my family I can tell everything to"). None of the items refers directly to loneliness and the word loneliness does not appear in the set of items. Respondents must rate how true each statement is for them, on a five-point Likert scale ranging from 1 (*not at all true*) to 5 (*always true*). In the current study, all item scores were reverse coded, with higher scores on each subscale indicating higher levels of loneliness. In our sample, reliability indices were high (0.84 for lack of peer-group integration; 0.88 for lack of peer-personal intimacy; 0.90 for lack of family-group integration; and 0.92 for lack of family-personal intimacy), and 90% of the sample was the same in which the RPLQ was validated in Portugal (Ribeiro et al., 2019).

Peer Assessment of Social Adjustment

Social adjustment and reputation were assessed by a Portuguese version (Correia et al., 2014) of the Extended Class Play (ECP; Burgess et al., 2006). This 37-item instrument assesses peers' evaluations of respondents' social functioning and reputation. Participants were instructed to pretend to be the directors of an imaginary class play and to nominate one boy and one girl from among their participating classmates for each of 37 positive and negative roles. Only same-sex nominations were considered, in order to eliminate possible sex stereotyping (Zeller et al., 2003). All item scores were standardized in terms of sex and classroom, to adjust for possible differences in the numbers of nominations and nominators. The ECP taps six dimensions of social functioning and reputation: (1) aggression (6 items; e.g., "Gets into fights"); (2) shyness/ social withdrawal (3 items; e.g., "Doesn't talk much or talks quietly"); (3) peer exclusion (3 items; e.g., "Often left out"); (4) peer victimization (3 items; e.g., "Hit or kicked by others"); (5) prosocial behavior (4 items; e.g., "Helps others"); and, (6) sociability/ popularity (4 items; e.g., "Everyone likes").

Peer nomination procedures are highly reliable, and in this study the Cronbach α for each subscale was as follows: 0.83 for aggression; 0.86 for shyness/ social withdrawal; 0.80 for peer exclusion; 0.85 for peer victimization; 0.73 for pro-social behavior; and 0.73 for sociability/ popularity.

Self-Reported Preference for Solitude

Preference for solitude was assessed using a Portuguese version of the Social Withdrawal Scale (SWS; Terrell-Deutsch (1999)). The SWS is a self-report measure that consists of a three-item indicator comprising the following: “I like spending time alone more than being with other young people”; “I would rather be with other young people than be alone” (reversed); “I spend time alone because I want to be alone more than I want to be with other young people.” Answers range from 0 (*not at all true*) to 5 (*always true*). In our study, internal reliability of this scale was acceptable (0.67).

Plan of Analysis

Data analyses were performed using the IBM SPSS Statistical Package (version 25). Descriptive statistics were computed for sample characterization, in addition to correlations to determine all variable associations. In order to identify loneliness profiles based on RPLQ subscales, we conducted a cluster analysis. This analysis was performed in a two-step procedure, using a combination of hierarchical and non-hierarchical clustering approaches. Such approach is recommended because it allows clusters with high internal and external homogeneities to be formed (e.g., Hair and Black, 2000).

In the first step, we conducted a hierarchical cluster analysis, using Euclidian distances for the initial observations and Ward’s method to identify the number of clusters. The decision as to how many clusters to retain was based on R^2 (sum of squares between groups). We opted for the solution with the smallest number of clusters that retained a considerable proportion of the total variance, offering more parsimony and interpretability. Second, we performed an additional procedure, the k-means method, to optimize the cluster solution in terms of participants’ distribution in each cluster.

We performed multivariate analyses of covariance (MANCOVAs) to test for differences among the loneliness profiles in the different forms of loneliness and dimensions of social adjustment to peer group, taking into account adolescents’ sex and using age and preference for solitude as covariates. Pillai’s Trace criterion (V) was selected as the multivariate test to assess the statistical significance of the effects, due to its robustness with unequal sample sizes (Tabachnick and Fidell, 2007). Where significant

multivariate effects were identified, subsequent univariate analyses of covariance (ANCOVAs) were performed, followed by *post-hoc* multiple comparisons with Bonferroni correction. We performed simple main effects analyses to explore interaction effects. The effect size was reported for all ANCOVAs using partial eta-squared (η_p^2).

Results

Prior to main analyses, descriptive statistics and correlations for all variables, including sex and age, were examined in order to determine whether they should be included as grouping factors or covariates in subsequent analyses.

Preliminary Analyses: Descriptive Statistics, Sex, and Age Differences

Means and standard deviations are shown in Table 1. We performed two one-way ANOVAs to test, separately, for sex and age differences between the different forms of loneliness, preference for solitude, and all dimensions of social adjustment. Regarding sex, statistically significant differences were found only in lack of peer-personal intimacy, $F(1, 689) = 40.88, p < 0.001$, and preference for solitude, $F(1, 689) = 7.71, p = 0.006$. Specifically, boys reported significantly higher scores on intimacy difficulties with their peer group and on preference for solitude than girls. Regarding age, adolescents were distributed in three groups (group 1: 11-12 years old; group 2: 13-14 years old; group 3: 15-16 years old) to ensure that the proportion of participants in each group was equivalent, and there were statistically significant differences among groups in lack of integration, $F(2, 690) = 7.99, p < 0.001$, lack of intimacy, $F(2, 690) = 6.82, p < 0.001$, in the family context, and in preference for solitude, $F(2, 690) = 5.49, p < 0.001$. Older youths reported significantly higher scores in all those variables than adolescents in the two younger age groups. Regarding social adjustment, younger adolescents (aged 11-12) were significantly more likely to be nominated by peers as excluded, $F(2, 676) = 3.80, p = 0.023$, and victimized, $F(2, 677) = 4.72, p = 0.009$, than youths in the two older age groups.

Preliminary Analyses: Correlational Analyses

Pearson’s correlations are presented in Table 2. We found moderate significant positive correlations between lack of integration in both peer and family social contexts ($r = 0.40, p < 0.001$), and between lack of intimacy in both social contexts ($r = 0.34, p < 0.001$). We also found strong significant positive correlations between lack of peer integration and intimacy ($r = 0.50, p < 0.001$), and between

Table 1 Descriptive Statistics and Comparison of Adolescents' Sex and Age for all Forms of Loneliness, Preference for Solitude, and all Dimensions of Social Adjustment to Peer Group

Study variables	Boys	Girls	1. Age 11-12	2. Age 13-14	3. Age 15-16	Sex		Age		Diff.
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M(SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	F	<i>p</i>	F	<i>p</i>	
Loneliness forms										
Lack of peer-group integration	0.01 (1.00)	0.03 (1.03)	0.00 (1.05)	0.02 (0.95)	0.11 (1.11)	0.06	0.81	0.42	0.66	
Lack of peer-personal intimacy	0.25 (1.04)	-0.23 (0.92)	-0.03 (0.98)	-0.02 (1.01)	0.14 (1.09)	40.88	0.00	***	0.92	0.40
Lack of family-group integration	-0.09 (0.91)	0.05 (1.07)	-0.18 (0.87)	0.07 (1.02)	0.25 (1.25)	3.33	0.07	7.99	0.00	*** 1. < 2., 3.
Lack of family-personal intimacy	-0.05 (0.90)	0.00 (1.06)	-0.18 (0.90)	0.07 (0.99)	0.18 (1.16)	0.46	0.50	6.82	0.00	*** 1. < 2., 3.
Preference for solitude	0.11 (1.03)	-0.10 (0.96)	-0.13 (0.98)	0.06 (0.99)	0.23 (1.04)	7.71	0.01	*	5.49	0.00 *** 1. < 2., 3.
Social adjustment										
Aggression	0.00 (0.63)	0.00 (0.68)	-0.01 (0.65)	0.01 (0.66)	0.04 (0.67)	0.00	0.96	0.23	0.80	
Social withdrawal	0.00 (0.79)	0.01 (0.81)	0.06 (0.84)	-0.03 (0.77)	-0.07 (0.77)	0.00	0.98	1.33	0.27	
Peer exclusion	0.00 (0.81)	0.00 (0.80)	0.10 (0.88)	-0.08 (0.75)	-0.03 (0.64)	0.00	0.99	3.80	0.02	* 1. < 0.2
Peer victimization	0.01 (0.82)	0.01 (0.82)	0.11 (0.92)	-0.05 (0.75)	-0.16 (0.58)	0.00	0.97	4.72	0.01	** 1. < 0.2, 0.3.
Prosocial behavior	0.00 (0.68)	0.02 (0.67)	0.04 (0.70)	0.00 (0.67)	-0.06 (0.61)	0.14	0.71	0.69	0.50	
Sociability/Popularity	0.02 (0.70)	0.02 (0.69)	-0.04 (0.67)	0.07 (0.71)	0.06 (0.71)	0.01	0.93	2.06	0.13	

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.000$

Table 2 Correlations among Study Variables

Study Variables	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Sex	0.09*	-0.01	0.24**	-0.07	-0.03	0.11**	0.00	0.00	0.00	0.00	-0.02	0.00
2. Age		0.06	0.06	0.14**	0.12**	0.13**	0.05	-0.04	-0.06	-0.10**	-0.07	0.07
3. Lack peer-group integration			0.55**	0.40**	0.28**	0.42**	-0.07	0.21**	0.26**	0.15**	-0.13**	-0.12**
4. Lack peer-personal intimacy				0.31**	0.34**	0.30**	-0.01	0.12**	0.17**	0.05	-0.10**	-0.09*
5. Lack family-group integration					0.65**	0.19**	-0.02	-0.05	0.00	-0.02	-0.07	0.01
6. Lack family-personal intimacy						0.15**	0.01	-0.04	-0.04	-0.06	-0.09*	-0.03
7. Preference for solitude							-0.07	0.11**	0.12**	0.08*	-0.04	-0.07
8. Aggression								-0.31**	-0.01	0.16**	-0.20**	0.15**
9. Social withdrawal									0.50**	0.23**	-0.02	-0.23**
10. Peer exclusion										0.63**	-0.20**	-0.29**
11. Peer victimization											-0.21**	-0.23**
12. Prosocial behavior												0.40**
13. Sociability/Popularity												

Note: * $p < 0.05$; ** $p < 0.01$

lack of family integration and intimacy ($r = 0.65$, $p < 0.001$). These results support the distinction between all forms of loneliness which were analyzed, and between the two types of relational provisions— integration and intimacy.

Regarding preference for solitude, we found: (1) a weak but significant positive association with sex ($r = 0.11$,

$p = 0.006$) and age group ($r = 0.13$, $p < 0.001$); (2) weak to moderate positive correlations with all forms of loneliness (between 0.15 and 0.42; $p < 0.001$); and (3) a significant weak positive association with all negative dimensions of social interactions with peer group, i.e., social withdrawal ($r = 0.11$, $p = 0.006$), peer exclusion ($r = 0.12$, $p = 0.001$), and peer victimization ($r = 0.08$, $p = 0.046$).

Regarding positive and negative features of social adjustment, socially withdrawn behavior, peer exclusion, and peer victimization were positively associated with lack of peer integration ($r = 0.21$, $r = 0.26$, $r = 0.15$, respectively; $p < 0.001$), and lack of peer intimacy ($r = 0.12$, $r = 0.17$, n.s., respectively; $p < 0.001$). Conversely, sociability/ popularity, and prosocial behavior were negatively associated with lack of peer integration ($r = -0.13$, $r = -0.12$, respectively; $p < 0.001$) and peer intimacy ($r = -0.10$, $r = -0.09$, respectively; $p = 0.010$, $p = 0.013$). Overall, as expected, positive dimensions of social adjustment were associated with fewer difficulties in integration and intimacy with peer group, while negative dimensions were associated with more difficulties in integration and intimacy in the same social context.

Finally, we found a weak but significant positive association between age group and lack of family integration ($r = 0.14$, $p < 0.001$) and family intimacy ($r = 0.12$, $p = 0.002$), as well as a weak but significant negative association with peer victimization ($r = -0.10$, $p = 0.003$). We also found weak correlations between sex and lack of peer intimacy ($r = 0.24$, $p < 0.001$) and preference for solitude ($r = 0.11$, $p < 0.001$).

Identification and Characterization of Loneliness Profiles

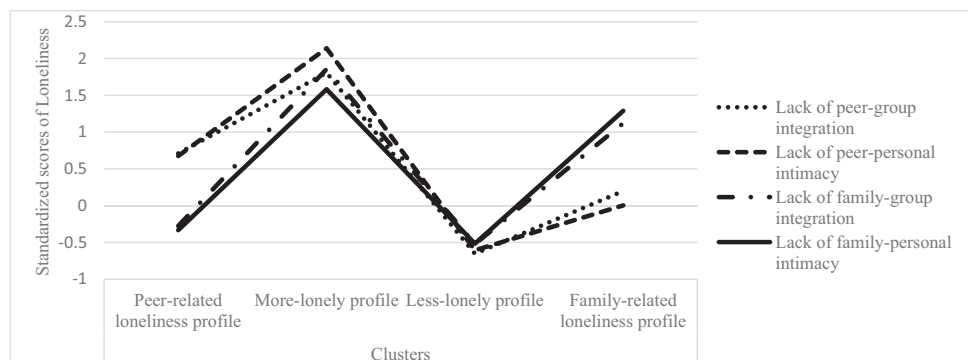
Given the main goals of our study, we conducted a cluster analysis on the four subscales of the RPLQ to identify adolescents with similar patterns of social and emotional loneliness, through lack of integration and intimacy in peer and family contexts. This procedure revealed a four-cluster solution (Fig. 1), each one with a specific configuration of different forms of loneliness. Based on our analysis of the dendrogram, applying parsimony and interpretability, followed by the R^2 criterion, the four clusters retained explained 59% ($R^2 = 0.59$) of the total variance. The four-cluster solution also explained 56% ($R^2 = 0.56$) of the variance in peer-group integration, 59% ($R^2 = 0.59$) in peer-personal intimacy, 60% ($R^2 = 0.60$) in family-group integration, and 62% ($R^2 = 0.62$) in family-personal intimacy.

The largest cluster, labeled the *Less-lonely profile*, comprised 50.4% ($n = 348$; 159 boys and 189 girls) of the sample. Adolescents in this cluster had moderately low scores on lack of integration and intimacy relating to both social contexts. That is, adolescents in this cluster reported having no integration or intimacy difficulties with either their peers or their family. By contrast, the smallest cluster, labeled the *More-lonely profile*, comprised just 5.8% ($n = 40$; 27 boys and 13 girls) of the sample and was characterized by moderately high scores on all four subscales of the RPLQ. Therefore, this cluster comprises adolescents who reported greater integration and intimacy difficulties with both peers and family. The remaining two clusters lie somewhere in between these two extremes. The cluster labeled as *Peer-related loneliness profile*, containing 25.8% ($n = 178$; 97 boys and 81 girls) of the total sample, included adolescents who scored moderately high on lack of integration and intimacy with peers, but low on the same dimensions in relation to family. Finally, the cluster labeled as *Family-related loneliness profile*, comprising 18.1% ($n = 125$; 51 boys and 74 girls) of the total sample, included adolescents who scored high on lack of integration and intimacy in relation to family but low on the same dimensions in relation to peers.

To ensure that each loneliness profile had a unique configuration of the different forms of loneliness, after controlling for age and preference for solitude, we conducted MANCOVA to analyze the effects of loneliness profiles and sex on the RPLQ four subscales. Results showed significant differences across profiles in the distinct forms of loneliness, $V = 1.33$, $F(12, 2040) = 136.21$, $p < 0.001$, $\eta^2_p = 0.45$, $\pi = 1.00$, with regard to sex, $V = 0.08$, $F(4, 678) = 14.71$, $p < 0.001$, $\eta^2_p = 0.08$, $\pi = 1.00$, and a significant interaction effect between loneliness profiles and sex, $V = 0.06$, $F(12, 2040) = 3.62$, $p < 0.001$, $\eta^2_p = 0.02$, $\pi = 1.00$.

Subsequent ANCOVAs revealed statistically significant profile differences (Table 3) for all RPLQ dimensions. *Post-hoc* multiple comparisons with Bonferroni correction showed that all loneliness profiles were statistically different

Fig. 1 Final Four-Cluster Solution based on Standardizing Scores for Social (Integration) and Emotional (Intimacy) Loneliness considering Peers and Family Social Contexts



scores on shyness/ social withdrawal and peer exclusion than adolescents in the Less-lonely profile and Family-related loneliness profile. Additionally, adolescents in the More-lonely profile were marginally significantly more likely to be nominated by their peers as being victimized than were adolescents in the Family-related loneliness profile. Adolescents in the Family-related loneliness profile displayed statistically lower levels of prosocial behavior than adolescents in the Less-lonely profile, who had the highest scores on this dimension.

A significant multivariate age effect was found, $V = 0.03$, $F(6, 654) = 3.75$, $p = 0.001$, $\eta^2_p = 0.03$, $\pi = 0.96$, for peer exclusion, peer victimization, and sociability/popularity. We also found a significant multivariate effect for preference for solitude, $V = 0.02$, $F(6, 654) = 2.08$, $p = 0.054$, $\eta^2_p = 0.02$, $\pi = 0.75$, with regard to aggression, shy/socially withdrawn behavior, and peer exclusion.

Discussion

The study of loneliness during adolescence is a relevant issue because the challenges and changes that characterize this developmental period may increase the risk of occurrence of feelings of loneliness and may harm social adjustment of youths. The present study was designed to contribute for the existing knowledge on loneliness by adopting a multidimensional and a person-centered approach, and also by examining sex differences across the various forms of loneliness. This procedure allowed to examine how different forms of loneliness are combined to create distinct loneliness profiles, thereby providing more detailed and richer information about the experience of loneliness. In all analyses, adolescents' sex was considered.

Although it is widely accepted that loneliness is a multidimensional construct, most studies have assessed loneliness as a global measure, whereas other studies have considered only mean-level differences (Hyland et al., 2019; Mund et al., 2020). Thus, given that this construct has not been accurately conceptualized, empirical results regarding predictors, outcomes and the prevalence of loneliness are likely to be misleading. Furthermore, the different forms of loneliness may be analyzed separately, but they should also be combined to investigate the co-occurrence of such diverse forms of loneliness within individuals.

Globally, the main goals of our study were (1) to identify distinct profiles of young adolescents with similar patterns of social and emotional loneliness, as reflected in integration and intimacy difficulties, in both family and peer context; (2) to compare such profiles and analyze sex differences; (3) analyze how the distinct loneliness profiles might be differentially associated with positive and negative

features of social adjustment to peer group dimensions, again taking adolescents' sex into account. It was our intention to assess the vulnerability of adolescents to social maladjustment to their peer group in each loneliness profile. For this purpose, we used a multidimensional self-report measure and a multidimensional peer-nomination measure.

Preliminary Considerations

Before proceeding with the main analyses of our study, we performed a preliminary analysis of the data to control for variables that could also influence loneliness. At a means level, our results revealed that boys reported higher emotional loneliness regarding their peer group, and a higher preference for solitude than girls. Similarly, correlations showed a weak but significant association between sex and preference for solitude, and a positive association between sex and emotional loneliness in the peer context.

As for age, our findings showed that older adolescents felt lonelier in the context of family and had higher preference for solitude. We found a weak but significant association between age and social and emotional loneliness in the family context. Adolescents are expected to gain more autonomy and independence as they grow older, although they continue to perceive their parents as supportive, even if they spend less time with them (e.g., Musetti et al., 2012). Finding the right balance between establishing distance from their parents and staying sufficiently connected to them may result in more family-related loneliness (Danneel et al., 2018; Musetti et al., 2012). Regarding younger youths, they were more likely to be excluded and victimized by their peers. Correlations showed a weak but significant association between age and victimization. Moreover, victimization was associated with a lack of integration (social loneliness) but not a lack of intimacy (emotional loneliness), in the peer context. Perhaps the lack of social engagement and integration in social networks enhances feelings of loneliness and negative social experiences (Rubin et al., 2008). Globally, both social and emotional loneliness in peers context were positively associated with all negative dimensions of social functioning (socially withdrawn behavior, peer exclusion, peer victimization), and negatively associated with positive dimensions (prosocial behavior, sociability/popularity).

Finally, the result of preliminary analyses may support the idea that preference for solitude, despite being normative and playing a constructive role in their development, may place adolescents at risk for maladjustment to their peer group (Wang et al., 2013). Preference for solitude was weakly associated with negative features of social functioning and social behavior, and moderately associated with all different forms of loneliness in both peer and family contexts. Our results also suggest that solitude, social

withdrawal and loneliness—all of which draw adolescents away from social contexts—are distinct constructs, even though they share the same features of low social contact and social support. Loneliness does not appear to be synonymous with social isolation (solitude), even though it is related to the amount of social contact (quantity). It is also related with defining features of social relationships such as intimacy and trust (quality) (Heinrich & Gullone, 2006). Based on the results obtained in preliminary analyses, we considered age and preference for solitude as covariates in subsequent analyses.

Loneliness Profiles and Sex Differences

Our findings revealed significant heterogeneity in how adolescents experience feelings of loneliness. After controlling for age and preference for solitude, we found four groups of adolescents with specific profiles of loneliness that could be differentiated in an understandable way. In other words, we found groups of youths who share the same constellation of the various forms of loneliness, but who are different from other groups of youths who also present feelings of loneliness. In line with previous studies, these results support the model of multidimensionality of loneliness (e.g., Goossens et al., 2009; Goossens & Beyers, 2002; Maes et al., 2016; Ribeiro et al., 2019), and provided empirical evidence to the argument regarding the existence of distinct forms of loneliness that reflect unmet particular relational provisions (Weiss 1973). Indeed, when differences are found between family- and peer-related loneliness, they may result from the difference in social context (family vs. peers) or in loneliness form (emotional vs. social). Moreover, our results also offer empirical evidence for the coexistence of different forms of loneliness that occur naturally during adolescence (Hyland et al., 2019; Maes et al., 2016; Shevlin et al., 2014). In that sense, our findings show the importance of distinguishing different groups among lonely adolescents, particularly those who experience heightened feelings of loneliness across their two main socialization contexts, to better act on the prevention of risk for socioemotional maladjustment.

The largest group of adolescents that was identified, labeled Less-lonely profile, comprises youths who reported low levels of social and emotional loneliness (few difficulties with integration and intimacy) in both family and peer group social contexts. As expected, most adolescents in our sample were able to successfully deal with the developmental challenges and changes in their social world, that are typical of adolescence. Conversely, the smallest group of youths that was identified, labeled More-lonely profile, comprises adolescents who reported high levels of social and emotional loneliness (high integration and intimacy difficulties) in both social contexts. They present

feelings of loneliness regarding both social contexts and relationships, family and peer group, which are perceived as unsatisfactory. As a result, adolescents in this group experience a lack of belongingness and emotional closeness. Additionally, two more different groups were identified. One, labeled Peer-related loneliness profile, includes adolescents who reported moderate levels of social and emotional loneliness (integration and intimacy difficulties) in the peer context, and low levels in the family context. Finally, the last group, labeled Family-related loneliness profile, contains youths who reported high levels of social and emotional loneliness regarding family, and low levels of loneliness relative to the peer group context.

During this developmental period, adolescents strive for autonomy and independence, decreasing family dependence, by distancing themselves physically and emotionally from their family members. Consequently, youths might experience unmet social needs. If some adolescents are able to substitute time spent with family with time spent with peers, others might not, thus experience loneliness. Furthermore, adolescents need to cope with changes in social expectations and relationships with their peers, which could lead them to rethink and question their peer relationships, and loneliness appears. Our results showed heterogeneity in how adolescents experience feelings of loneliness.

Considering sex, our results showed a significant interaction effect between sex and loneliness profiles regarding lack of peer-group integration, lack of family-group integration, and family-personal intimacy. Adolescent girls who share the More-lonely profile showed significantly higher social loneliness related to peer's context, and higher social and emotional loneliness related to family context. This finding is particularly important considering the potential consequences of loneliness, not only on the adjustment difficulties, but also on internalizing difficulties, such as depression and anxiety, suicidal ideation, poor social skills, among other negative consequences. This finding may contribute to the literature by demonstrating that it is not only a matter of how lonely someone can feel. Being a girl increases the risk of suffering negative consequences of loneliness, during adolescence.

Additionally, after controlling for age and preference for solitude, our findings revealed significant sex differences, for all forms of loneliness experienced in the two different social contexts. In the peer context, girls reported feeling more social loneliness (i.e., higher lack of integration), whereas boys reported experiencing more emotional loneliness (i.e., higher lack of intimacy). In the family context, girls reported feeling more social and emotional loneliness (i.e., higher integration and intimacy difficulties) than boys. Prior studies have suggested that interpersonal relationships may differ depending on sex (e.g., Rose & Rudolph, 2006). Boys tend to engage with larger groups of peers, colleagues,

or friends, whereas girls tend to be more intense and exclusive in their friendships (e.g., Gifford-Smith & Brownell, 2003). Specifically, girls engage in closer dyads or small groups of friends, where intimacy is greater, thus experiencing richer friendships than those of boys (Parker & Asher, 1993; Rose & Rudolph, 2006). Therefore, these differences in interpersonal relationships may explain why girls experienced less emotional loneliness, whereas boys experienced less social loneliness.

Regarding the family context, prior studies suggest that girls tend to be more protected through greater family support than boys (Maes et al., 2015; Musetti et al., 2012). Furthermore, as suggested by Danneel et al. (2018), girls may face greater difficulties establishing a balance between distancing themselves from their family (parents) and staying connected with them. This may increase adolescent girls' vulnerability to experiencing (social and emotional) loneliness in their family during this developmental period.

Despite these results, sex differences related to different forms of loneliness have not yet been analyzed extensively and future research is needed to examine whether they also hold for adolescents of different ages in different cultures. Heinrich and Gullone (2006) have argued that sex differences may be the result of methodological issues, but the majority of studies doesn't consider the complexity of the loneliness construct.

Loneliness Profiles and Social Adjustment to Peer Group

As expected, our results suggest that different forms of loneliness may co-exist within the same individual. Furthermore, such forms of loneliness may be organized in specific ways that form distinct profiles in adolescents, which, in turn, differ in how their peers view and behave towards them. The four groups of adolescents, which reveal specific profiles of loneliness, were compared regarding positive and negative features of social adjustment to peer group, reported by peer nominations.

Regarding social functioning and social adjustment to peer group, the largest group of adolescents in our study, Less-lonely profile, showed the most adaptive profile (lower vulnerability to maladjustment to peer group), followed by those with the Family-related loneliness profile. According to their peers, adolescents in the Less-lonely profile scored highest on prosocial behaviors and were more likely to exhibit such behaviors than adolescents in the Family-related loneliness profile.

Prior research has shown that adolescents who exhibit socially appropriate and competent behaviors (e.g., engaging, helping, sharing, and cooperating) are more socially accepted and popular (e.g., Freitas et al., 2019), which in turn contributes to lower levels of loneliness (Woodhouse

et al., 2012). Prosocial behavior described as intentional and voluntary behavior that benefits another, has been identified as an important indicator of peer acceptance and of social competence (Lafontana & Cillessen, 2002). This is a behavior that is valued and appreciated by peers (Rubin et al., 2009)

Social relationships with peers are the context in which individuals, particularly youth, develop skills such as communication, conflict management and resolution, reciprocity, and interpersonal intimacy (Heinrich & Gullone, 2006). Young adolescents learn, in the social experiences they have with their peers, about what constitutes normative behavior and, therefore, being well-adjusted has a fundamental relevance for their development. The peer group context becomes increasingly important during adolescence, but family group also maintains its importance.

Adolescents in the Peer-related loneliness profile and, particularly, those in the More-lonely profile displayed the most maladaptive profiles (higher vulnerability to maladjustment to peer group). Both sets of adolescents presented higher socially withdrawn behavior and suffered more interpersonal adversity, such as peer exclusion, than their counterparts. Previous research that also used peer nominations has found a strong link between socially withdrawn behavior, peer victimization and internalizing difficulties such as loneliness (Woodhouse et al., 2012). Moreover, Cacioppo et al. (2000), for example, showed that, compared with non-lonely individuals, lonely individuals normally deal with loneliness and stress by behaviorally disengaging, seeking either instrumental support (information, assistance, guidance) or emotional support (understanding, moral support). Lonely individuals appear to be more passive in their attempts to cope with feelings of loneliness and to behave in a socially ineffective manner towards others, leaving them more vulnerable to being perceived by their peers as withdrawn and more likely to be excluded.

Adolescents in the More-lonely profile were also more victimized by their peers than adolescents who felt lonely in the family context. By withdrawing from or avoiding social interaction and by displaying submissive behavior, these youths may be considered as vulnerable for peer maltreatment because they are perceived to be easy targets (Rubin et al., 2009). Conversely, adolescents who lack relationships and feel lonely may be less motivated to behave prosocially towards others. The development of positive peer relationships and friendships is crucial in helping youths accomplish developmental tasks such as forming their identity, developing social-cognitive skills and self-esteem, and establishing autonomy. Relational difficulties, however, may result in limited social involvement or negative peer interactions, which can lead to negative self-

perceptions and fewer opportunities to practice and refine social skills.

The present findings corroborate those of previous studies and add to our existing knowledge about loneliness. Our results showed that adolescents' sex may truly represent a vulnerability factor for loneliness. Researchers and policy makers need to pay increasing attention to loneliness and continue to explore aspects that make youth vulnerable to feelings of loneliness.

Although the present study has strengths, it also has limitations. Our results need to be replicated in a large sample with a more heterogeneous groups of participants, i.e., including other cultural and socioeconomic contexts. Moreover, the findings are based on cross-sectional data, which prevent any conclusions about causation or long-term effects from being made. Hence, future longitudinal research is also needed. Additionally, the participants in our research were recruited using a convenience sampling method, limiting the possibility to generalize results. Furthermore, this study was conducted in a specific European country, namely Portugal. Given the salience to good manners, sense of responsibility, tolerance, solidarity, and support for others (Ramos & Magalhães, 2021), the threshold for loneliness in this societal setting may be relatively low. At the same time, even if interdependent cultures protect their communities from being alone, they may not protect them from feelings of loneliness.

This study brings new insight to our knowledge of the construct of loneliness. Our results may help to identify adolescents at risk of severe loneliness and thereby support the implementation of policies and public health interventions throughout adolescence. Protecting youths from adverse experiences and risk factors that may impact their potential to develop are critical, not only for their well-being during adolescence, but also for their psychological and physical health in adulthood.

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Compliance with Ethical Standards

Conflict of interest The authors declare no competing interests.

Ethical Approval All procedures performed in the current study were in accordance with the recommendations of APA Ethical Guidelines, and with the 1964 Helsinki declaration and its later amendments, ensuring the privacy and confidentiality of participants' information. It is also approved by the University Ethical Committee.

Informed Consent Informed consent was obtained from the parents or guardians of all participants in the study and assent was obtained from participants.

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