Conceptualising Loneliness in Adolescents: Development and Validation of a Self-Report
Instrument

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Abstract

This paper reports the development and psychometric evaluations of a multidimensional model of loneliness in Australian adolescents. In the first study a new instrument was designed and administered to 1,074 adolescents (ages 10-18 years, $\underline{M} = 13.01$). An exploratory factor analysis from data supplied by 694 of these participants yielded a 4-factor structure (Friendship, Isolation, Negative Attitude to Solitude, and Positive Attitude to Solitude). Competing measurement models were then evaluated using confirmatory factor analysis with data from the remaining 380 participants; strong support was demonstrated for the conceptual model. Significant main effects were evident for geographical location (rural remote/urban), Age and Sex. In a second study, involving 235 Australian adolescents (ages 10.0-16 years, $\underline{M} = 13.8$) the superiority of the first-order model represented by four correlated factors was confirmed. The findings have clinical and practical implications for professional groups represented by child and adolescent psychiatry, pediatric and clinical psychology services, researchers, and educators. Specifically, the new self-report instrument identifies adolescents who are at risk of loneliness and its associated adverse outcomes and in doing has the potential to offer new insights into prevention and intervention.

Keywords: Loneliness; Adolescents; Assessment; Instrumentation.

Loneliness can be a debilitating psychological condition characterized by a deep sense of social isolation, emptiness, worthlessness, lack of control and personal threat [1]. Synonymous with perceived social isolation [2], loneliness has been defined as a negative or distressing feeling that accompanies the perception that one's social needs are not being met by the quantity or especially the quality of one's social relationships [3].

Research has established strong links between loneliness and a myriad of adverse physical, psychological, social and mental health outcomes [4-7], including: Depression, recreational drug use, suicide ideation and violence [8]; parasuicide and self-harm [9]; eating disturbances, obesity and sleep disturbances [10]; adolescent alcohol use, general health problems, less than optimal well-being and somatic complaints [6]; greater levels of stress, greater age related increases in blood pressure and diminished cardiovascular functions underlying blood pressure regulation [11]; personality disorders and psychoses [12]; diminished executive control [13]; and cognitive decline and dementia [14]. As a consequence, there is no doubt that if left unattended, loneliness has serious consequences for cognition, emotion, behaviour and health [2].

During adolescence, loneliness is normative [15] and to some extent expected because at this time significant changes occur in social expectations, roles, and relationships [16]. It comes as no surprise then that adolescence has been identified as *the* peak period of high risk for loneliness [17], with 66-79% of young people reporting feelings of loneliness at some time; of these, 15-30% describe these feelings as persistent and painful [18, 19]. Furthermore, the potential for loneliness to become chronic and in some cases pathological [20, 21] is particularly evident during adolescence [22]. Indeed, the association between loneliness, hopelessness, psychiatric conditions and suicidal behaviour is well established in the adolescent research literature [see 23-25].

During this developmental period adolescents begin to move away from family and home centred activities to develop closer ties with peers and peer groups [26] and achieve greater intimacy in their relationships with peers [27]. This move towards independence is however, accompanied with the risk of “increased feelings of separateness ... and vulnerability to, emotional and social loneliness” [18, p. 285-286]. Indeed, trajectories of loneliness between 7 and 17 years have been found to predict depression, more frequent use of doctor’s services, poorer self-reported general health, and the consumption of more units of alcohol per drinking occasion at age 17 [28]. Thus, for many the failure to resolve loneliness prior to moving out of adolescence can have significant adverse outcomes (for a review see 8, 19, 29).

To date, loneliness has been measured as either a unidimensional construct (i.e., loneliness is the same for everyone across circumstances and causes, and can be measured by means of a single scale) [30-32] or as a multidimensional construct (i.e., varying in intensity and across causes and circumstances, and where different social relationships give rise to different forms of loneliness) [19, 33-36]. Within this multidimensional approach distinctions have been made between: social and emotional loneliness [37]; friendship loneliness (social loneliness), family loneliness and romantic loneliness [38]; and loneliness and aloneness (i.e., peer related loneliness and family loneliness, and positive attitude to solitude and negative attitude to solitude) [see 39].

Although our understanding of loneliness has increased, concerns have been expressed about many of the existing scales because they tend to include correlates or consequences of loneliness or aloneness (e.g., agitation and dejection: The Loneliness Rating Scale, [40]; satisfaction or not with romantic-sexual relations, relations with larger community groups: Differential Loneliness Scale, [41]; hopelessness and blaming others: Loneliness Scale, [42]; emotional distress, feelings of inner strength, self-alienation: The Loneliness Questionnaire, [43]). Furthermore, a number of

scales do not view depression as a separate factor from loneliness, which although correlated, remain distinct constructs [44]. Some scales also include many other dimensions (e.g., anxiety, anger, optimism, self-esteem, social skills, avoidant thinking, agreeableness, shyness, sociability), but loneliness is a distinct trait [44]. While loneliness may well be instrumental in activating these states, it (i.e., loneliness) remains a central individual difference characteristic.

Although a significant body of loneliness research has emanated from adults or “young adults”, comparatively little has been conducted with adolescents. One of the most compelling adolescent based studies [34] tested competing factor models on data collected from 534 Dutch adolescents (ages 15-18 years) using nine different instruments (14 subscales). The superiority of a four factor model of loneliness and solitude (i.e., peer or friendship related loneliness, family loneliness, positive attitude to solitude and negative attitude to solitude) was clearly evident. The findings highlighted that not only was the distinction between loneliness and aloneness important, but also that “attitudes toward being alone might affect one’s vulnerability to feeling lonely when alone” [34, p. 890]. This Loneliness-Aloneness distinction has also been highlighted elsewhere [45] where it was argued that the former is a subjective and unpleasant experience, whereas aloneness refers to an objective communicative isolation, which is not necessarily an unpleasant experience. Conversely, some have argued that feelings of loneliness may “open a path for adolescents to gain greater self-insight and to become more thoughtful and reflective adults” [46, p. 295]. Moreover, defining oneself as a person who likes to spend time alone, may narrow the gap between actual and ideal social networks, and in doing reduce feelings of loneliness [47].

The limited research conducted with young people to date has had important implications for the conceptualizations of loneliness. Nevertheless, current instruments “may measure only a

subset of the multidimensional experience of loneliness in adolescence” [34, p. 894]. This present research attempts to address this through two studies, which (i) describe the development of a new self-report instrument designed to measure loneliness in adolescents, (ii) evaluate different hypothesized measurement models in samples of adolescent school aged students, and (iii) assess the extent to which the measure is equivalent across males and females, younger and older adolescents, and urban and rural/remote locations.

Study 1: The development of the Perth A-Loneness scale (PALs)

Method

The first step was to review the relevant literature and existing instruments in order to select items for possible inclusion in the new instrument. To be included in the review, instruments had to have been used in research published in peer reviewed journals and to include items that could be applicable to adolescents. Furthermore, instruments had to contain items “capable of assessing actual or perceived deficits in different types of social relationships and different qualitative dimensions within these different social relationships” [48].

In total 14 instruments were selected and reviewed: The UCLA Loneliness Scale [31, 32]; The Loneliness Rating Scale [40], The Differential Loneliness Scale [41], The Illinois Loneliness Questionnaire [49], The Louvain Loneliness Scale [50], The Relational Provision Loneliness Questionnaire [51], Loneliness Deprivation Scale [52], Loneliness Scale [42], The ESLI [53], Loneliness Questionnaire [43], Social and Emotional Loneliness Scale [54], Young Loneliness Inventory [55], Peer Network and Dyadic Loneliness Scale [56], Three-Item Loneliness Scale [57], Children’s Loneliness Scale [30], The Index of Social Involvement [58], Parent and Peer Related Loneliness Questionnaire [59], and The Sociability Scale [60].

From this review, 139 items were identified for possible inclusion in the new instrument. These items were subsequently reduced to 68 as a result of a panel of six individuals with expertise in child and adolescent psychology and measurement and assessment identifying and removing duplicate items, items not appropriate for use with adolescents, and items that were correlates or consequences of loneliness. In addition, to achieve as comprehensive a coverage as possible of loneliness in adolescents and to generate new items, 34 interviews were conducted with randomly selected Australian early adolescent primary ($n = 20$; 8 males, 12 females, ages 10-12 years) and adolescent high ($n = 14$; 9 males, 5 females, ages 13-17 years) school students from five schools located in low to high socioeconomic status areas as indexed by their postal codes from the Socio-Economic Indexes for Areas within Western Australia [61]. Prior to the interviews being conducted permission was obtained from the Human Research Ethics Committee of the administering institution and informed written consent was obtained from both parents and the participating students.

The interviews sought information pertaining to *Friendships* (in general, the importance of friendships, groups of friends, and movement between friends and friendship groups); *Aloneness* (feelings when alone, how often they were alone, what they liked and did not like about being alone, and choosing to be alone); and *Loneliness* (differences between being alone and lonely, experiences of loneliness, how often they felt lonely, causes of loneliness, and identifying peers who appeared lonely).

From this process, 11 new items were generated, resulting in 79 items in total. All 79 items were then revised to be in a self-report, age-appropriate format, using a six point scale anchored with the descriptors *never*, *rarely*, *sometimes*, *often*, *very often*, *always*. These items were worded such that there was a balance of negative and positive items. Scoring was on a one-to-six basis with higher scores being indicative of higher levels of feelings of loneliness.

The readability levels of the newly developed instrument, tentatively named The Perth A-Loneness scale (PALs) was measured using The Flesch-Kincaid Grade Level (i.e., the number of years of education required to understand a standard reading passage) and The Flesch Reading Ease (i.e., the difficulty level of reading a normal reading passage) [62, 63]. The PALs was considered appropriate and comprehensible and easy (reading ease = 82.3) for Australian school students enrolled in Grade 5 (Flesch-Kincaid Grade Level; age 10 years and above).

Participants and settings

In total 1,074 Australian adolescents were recruited through schools to complete the PALs. For the purposes of data analyses the sample was divided into two groups for exploratory (EFA) and confirmatory (CFA) factor analysis. Two hundred and sixty seven early adolescent primary school students (126 males and 141 females) and 427 high school adolescent students (251 males and 176 females) from 6 schools comprised the exploratory sample. The remaining 380 (52% males and 48% females) from two schools formed the cross-validation sample. (For the moderator analysis, the total sample [$n = 1074$] was used.) Table 1 shows the distribution of participants by age and sex. Ages ranged from 10.1 to 18 years ($M = 13.01$ years, $SD = 2.16$).

All participating schools ($n = 8$) were located across different socio-economic status (SES) areas as indexed by their postal codes from the Socio-Economic Indexes for Areas within Western Australia [61]. One high school was in a low SES area, three high schools were in low-middle SES areas, while two primary schools were located in low-middle SES areas, and one primary school in a high SES area. One District High School (i.e., caters for primary and high school students) was located on the boundaries of the metropolitan and rural regions in a middle SES area.

For the total sample used in the data analysis, five of the schools were located in the metropolitan area of Perth, the capital city of Western Australia, two were located in remote/rural areas, and the other was a District High school.

Procedure

Permission to conduct the research was initially obtained from the Human Research Ethics Committee of the administering institution and the State Department of Education. Following this, 12 schools were randomly selected from a mix of socioeconomic and metropolitan/rural areas and their principal's contacted to ascertain their interest in participating in the research. Information sheets explaining the research, along with consent forms for parents were delivered to the eight schools agreeing to participate in the study. The sample of 1,074 students represented an affirmative return rate of 62%.

The PALs was administered to the participants in groups of approximately 20-25 students during their regular class time by school personnel who had been nominated by the principals to liaise with the researchers. Each scale administrator was provided with a written set of instructions to ensure standardization of administration. Prior to completing the instrument participants were informed of the nature of the research and were assured of the anonymity of their responses.

Data analysis

For the factor modelling, the sample was divided into two groups. Six schools were in the exploratory sample ($n = 694$) and the other two schools were in the cross-validation sample ($n = 380$). For the moderator analysis, the total sample ($n = 1074$) was used.

In the exploratory phase, maximum-likelihood factor analyses specifying unrestricted, then one, two, three, and four correlated (Promax) factors were indicated. A four factor solution, with

each factor comprising six items, was considered superior to the other factor solutions. When the core set of six items for each of the four factors were identified, these were evaluated by specifying a measurement model using structural equation modelling [64]. Then the second sample was used and a structural model specified (using AMOS, 19) [65]. Various fit-indices assisted in providing evidence of the goodness-of-fit of the accepted model: The Comparative Fit Index (CFI), the Normed Fit Index (NFI), and the Root Mean Square Error of Approximation (RMSEA) and its confidence intervals. Although a value of .90 for the CFI and NFI indices has served as a rule-of-thumb lower limit threshold for acceptable fit, a value of .95 is expected of models considered to be well fitting [66]. RMSEA values of less than .06 indicate a good fit, and values as high as .08 indicate a reasonable fit [66]. Finally, the estimates of reliability for the four factors were estimated using coefficient alpha, and if above .70 provided added confidence for using these scales in subsequent analyses.

A multivariate analysis of variance (MANOVA) was used to evaluate the effects over the four loneliness scales on the basis of school location (metro, district, rural/remote) age, and sex differences. Where there were overall differences, univariate analysis of variance and Scheffe post-hoc tests were used to identify specific effects.

Results

Table 2 presents the EFA factor loadings and the correlations between the factors for the best six items for each of the four conceptual factors. The suitability of the data in the matrix for factor analysis was assessed on the basis of three criteria: (a) a visual inspection of the data matrix for correlations in excess of .30 [67], (b) the Kaiser-Meyer-Olkin's measure of sampling adequacy (MSA; 68, 69) and (c) the Bartlett's test of sphericity [70]. The MSA value obtained was .90, exceeding the recommended minimum value of .60 [67] and this value was considered

“marvellous” according to Kaiser’s [69] guidelines. Bartlett’s test of sphericity [70] reached statistical significance, $p < .001$, demonstrating the suitability of the correlation matrix to be factor analysed.

The four-factor solution ($\chi^2 = 336.658$, $df = 116$, $p < .001$), comprising 24 items and explaining 42% of the total variance was interpretable. All items loaded high on the expected factor and low on the others. Table 2 shows the items that loaded on Factor 1 reflected positive behaviours relating to having reliable, trustworthy supportive friends and was thus labelled *Friendship*. The items loading on the second factor were concerned with having few friends or believing that there was no one around offering support and were named *Isolation*. The third factor items (*Positive Attitude to Solitude*) referred to the positive aspects of being alone. Items depicting the negative aspects of being alone loaded on the fourth factor (*Negative Attitude to Solitude*).

The Cronbach’s alpha coefficient was acceptable for each subscale: Friendship ($\alpha = .86$), Isolation ($\alpha = .80$), Positive Attitude to Solitude ($\alpha = .78$) and Negative Attitude to Solitude ($\alpha = .77$).

Defining alternative models

The structure of the five models tested is shown in Table 3. A one factor model where all items loaded on a single factor was included to test for Loneliness and Solitude being a common emotional state [cf. 34]. Next we assessed: a two factor model which conceptualized items as belonging to either Loneliness or Attitudes to Solitude. Then two alternative three factor models with three correlated factors representing a) Friendship, Positive Attitude to Solitude, and Negative Attitude to Solitude; and b) Friendship, Isolation, and Attitudes to Solitude were tested.

Finally, the full four factor model (Friendship, Isolation, Positive Attitude to Solitude, and Negative Attitude to Solitude) was tested.

Table 3 also reports the fit indices of the different models. On the basis of the model fit criteria cited earlier, the four factor model provided the best fit. The CFI (.92), NFI (.91) and RMSEA = .056 (90 % CI: .054, .059) were all in favour of the four factor model. The standardized factor loadings of the final confirmatory model (run on the second half of the data from Study one) are reproduced in Figure 1. The estimates of reliability for each of the factors were sufficiently high to have confidence in using the total scores in further analyses.

Moderator effects

The location, age and sex differences in means across the four loneliness-solitude factors were evaluated using MANOVA (based on the entire sample size from study one). These are presented here as main effects as there were no significant interaction effects.

Location effects. Five of the schools were metropolitan city schools ($n = 368$), two were rural/remote ($n = 79$), and one was a District (semi-urban, $n = 247$) school. There was a multivariate main effect for location $F(8, 2098) = 4.05, p < .001$ and the results of the univariate F tests revealed a significant difference for Negative Attitude to Solitude $F(2, 1052) = 13.96, p < .001$. Adolescents in rural/remote schools reported higher levels of Negative Attitude to Solitude ($M = 3.19, SD = .95$) compared to those in Metropolitan schools ($M = 2.82, SD = .93$) and District schools ($M = 3.08, SD = 1.02$) (effect-sizes between rural/remote and metropolitan/district .39).

Age effects. There was no increased discrimination between Friendship and Isolation, or between Positive and Negative Attitude to Solitude over the age groups. Further, it appears that these dimensions do not separate as students advance through adolescence. There was a

multivariate main effect for age $F(24, 3647) = 5.35, p < .001$ and the univariate F tests revealed a significant difference for Negative Attitude to Solitude $F(6, 1054) = 15.43, p < .001$. As can be seen in Table 4, as adolescents get older Negative Attitude to Solitude declines while Positive Attitude to Solitude increases, although somewhat less so; the effect size between the top two (i.e., 16 and 17 years) and the bottom two ages (10 and 11 years) was $-.55$ for Negative Aloneness and $-.15$ for Positive Aloneness.

Sex differences. There was a multivariate main effect for sex $F(4, 1047) = 4.87, p < .001$ and the univariate F tests revealed a significant difference for Friendship $F(1, 1050) = 19.62, p < .001$. Females scored higher ($M = 4.64, SD = 1.04$) than males ($M = 4.36, SD = 1.04$). The effect-size = $.27$

Study 2: Further testing the four factor model

Participants and settings

A group of 235 Australian adolescents completed the PALs in this second study: 93 early adolescent primary school aged students (34 males and 59 females) and 142 high school adolescent students (57 males and 83 females; two did not supply gender) from 11 schools. The ages of the total sample ($n = 235$) ranged from 10.0 to 16.1 years ($M = 13.8$ years, $SD = 2.32$).

All participating schools were located across a range of socio-economic status (SES) areas as indexed by their postal codes from the Socio-Economic Indexes for Areas within Western Australia [61]. Eight of the schools (four primary and four high) were located in the metropolitan area of Perth, the capital city of Western Australia. The remaining schools were located in remote/rural areas (one primary and one high), while the other was a District High School located on the boundaries of the metropolitan and rural regions. Three high schools were in low-middle SES areas and one was in a low SES area. Of the primary schools, three were in low-

middle SES areas, and one in a high SES area. The two rural/remote schools were in low-middle SES areas, while the District High School was in a middle SES area.

Procedure

Information sheets explaining the research, along with consent forms for parents and students were delivered to 11 schools that agreed to participate in the study. The sample of students in Study 2 represented an affirmative return rate of 91% from those selected to be involved. The PALs was administered to the participants in groups of approximately 5-15 students during school time by a senior teacher nominated by the principal of each school. Each scale administrator adhered to a written set of instructions to ensure standardization of administration.

Data analysis

The full four factor model (Friendship, Isolation, Positive Attitude to Solitude, and Negative Attitude to Solitude) was tested. The same fit-indices utilised in Study 1 were used to assess the goodness-of-fit of the model in Study 2, namely the Comparative Fit Index (CFI), the Normed Fit Index (NFI), and the Root Mean Square Error of Approximation (RMSEA) and its confidence intervals.

Results

Table 3 reports the fit indices of the (Study 2) full four factor model. On the basis of the same model fit criteria utilised in Study 1, the four factor model in Study 2 provided a good fit. The standardised factor loadings of the confirmatory model are reproduced in Table 5 along with those from Study 1 (for comparison). As can be seen, the table reveals that the factor loadings range from .50 (Factor 4: Negative Attitude to Solitude “*When I get bored, I am unhappy*”) to .88 (Factor 1: Friendship “*My friends will stand by me in almost any difficulty*”). The estimates

of reliability for the four factors were found to be satisfactory: Friendship $\alpha = .91$; Isolation $\alpha = .80$; Positive Attitude to Solitude $\alpha = .86$; and Negative Attitude to Solitude $\alpha = .80$.

Discussion

The adverse physical, psychological, social and mental health outcomes of loneliness during adolescence are well documented [5-7], thereby making it a major concern during this peak period of development [20, 26]. Recent research [71] with almost 2,000 Finnish 12 to 18 year olds found that fear of future loneliness has increased among adolescents, thereby further substantiating the major concerns expressed by earlier researchers.

Many of the existing measures, however, appear to have been developed with/for adult populations and may not adequately identify and discriminate the dimensions of loneliness as experienced by young people during the critical transition years between adolescence and on into adulthood. Furthermore, there is considerable overlap in many of the existing scales. For example, four factors have been found to be common among seven of the most commonly used loneliness scales: social loneliness, emotional loneliness, negative effect, and family loneliness [72]. The inclusion of family items, we would argue, can unnecessarily confuse the construct with the situations that can relate to loneliness. It may well be for example, that for some adolescents there are situational effects relating to loneliness in families but not at school, or that for some adolescents there is a more underlying trait of loneliness that pervades across situations. Some young people can be lonely at school but not at home, can cope with aloneness at home but not at school, or can be lonely at school and home but not among their group of after school friends. Other adolescents may, however, experience a sense of loneliness pervasively across all situations. For these reasons we omitted family related items in our scale.

Recent research suggests that loneliness is a multidimensional phenomenon [see 34, 36]. The present study supports this and we argue that this has significant clinical and practical implications for allied health professionals. Importantly, it provides professional groups represented by child and adolescent psychiatry, pediatric and clinical psychology services, researchers, and educators with a new easy-to-administer self-report instrument with which to measure multidimensional loneliness in adolescents. Although the issue has been raised that sole reliance on self-report can give rise to the issue of shared method variance [50], loneliness requires insight into the subjective dispositions that can be difficult to obtain from third parties. Moreover, reliability of self-report inventories has been found to increase from childhood to adolescence for measuring constructs such as psychopathology, while the validity of that from third parties (e.g., teacher- and parent-reports) decrease [73, 74].

In three separate administrations with samples of typically developing Australian adolescents, we examined the psychometric properties of our new instrument (i.e., PALs) through both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), and internal reliabilities. The EFA of the items comprising the PALs from a large sample of adolescents suggested a four-factor structure consisting of Friendship and Isolation (i.e., Loneliness) and Positive Attitude to Solitude and Negative Attitude to Solitude (i.e., Aloneness). The results of the initial CFA confirmed that the four-factor structure of the PALs was an excellent fit to the data and was the best of the alternative competing models tested. In a second study involving a CFA from data obtained from over 200 adolescents the four-factor structure consisting of Friendship, Isolation, Positive Attitude to Solitude, and Negative Attitude to Solitude was further confirmed. Thus, in line with previous suggestions [19, 38, 56], loneliness in adolescents can be deemed a multidimensional construct.

The current findings also provide support for previous research that demonstrated that following the testing of competing factor models on data collected using nine different instruments (14 subscales), a four factor model was superior [34]. Similar to this the four factor model in the present study also distinguished between loneliness and aloneness. Over 80% of early aged adolescents (i.e., 9 to 11 year olds) understand this distinction between loneliness and aloneness [75]. Moreover, it has been argued that not only is the distinction between loneliness and aloneness important, but also that “attitudes toward being alone might affect one’s vulnerability to feeling lonely when alone” [34, p. 890]. Indeed, while some adolescents have an affinity for being alone others tend to have an aversion to it [50]. This attitude toward being alone may relate to increases or decreases in loneliness [47]. It may be that in an attempt to deal with feelings of loneliness the lonely adolescent develops an affinity towards aloneness. This defining of oneself as someone who likes spending time alone narrows the gap between the actual and ideal social network and in doing so decreases feelings of loneliness [47].

The findings from the present research pertaining to Australian males and females at different ages in remote/rural and urban areas also need to be viewed concurrently in the light of findings from others studies. For example, the primary psychological needs of young people change as they grow older, and it has been suggested that this may result in differential experiences of loneliness for boys and girls [26, 76]. Conversely, in one review no differences were identified between boy’s and girls’ reports of loneliness [77]. In the present study, females scored higher than males on the friendship factor, suggesting that adolescent girls have reliable, trustworthy, supportive friends. In another study measuring loneliness in children and adolescents across seven different countries, it was also found that females were less socially

lonely than their male peers [78]. It was suggested that females tend to make plans with non-family members more often than males do and hence have greater levels of friendship.

More recently, one study reported that their four factor model was invariant across gender [34], while another [79] found that although no significant gender differences were evident in social or emotional loneliness at the Grade Four level, by Grade Five the emotional loneliness of boys was notably higher. Previous evidence has suggested loneliness increases with age and on through adolescence [see 26]. In the present study, our multidimensional model enabled a more nuanced understanding of loneliness at different ages. For example, it was found that as students got older Negative Attitude to Solitude declined while Positive Attitude to Solitude increased, thereby suggesting that young people find benefits of spending time on their own. It has been argued that the ability to enjoy solitary activities *can* provide adolescents with pleasurable positive opportunities to become more thoughtful and reflective and to engage in self-reflection [46].

Whether environmental contexts (urban versus remote/rural areas) play a role in adolescents' experiences of loneliness has also been raised in previous research [see 26]. It has been shown, for example that adolescents living in rural communities in the USA present with extremely high loneliness scores [80]. Furthermore, rural males and females score significantly higher on social loneliness than emotional loneliness (whereas no gender differences in urban males' and females' reports of social versus emotional loneliness were identified) [26]. In the present study Australian adolescents in remote/rural schools reported higher levels of Negative Attitude to Solitude (i.e., negative aspects of being alone such as boredom, time dragging, unhappiness and wishing there was a friend) compared to those in metropolitan based schools. It

may be that individuals in remote/rural areas have far fewer opportunities to interact with groups of friends, which in turn leads to the Negative Attitude to Solitude.

Although being alone is sometimes associated with feelings of loneliness, spending occasional time away from others has been said to predict psychological well-being [81]. The key to positive mental health is, however, the ability to enjoy these solitary activities [46]. What the findings of the present study demonstrate is that this may not be the case for adolescents in remote/rural areas who experience more Negative Attitude to Solitude (e.g., isolation, boredom, and unhappiness) associated with their geographical location. Thus, community contexts need further exploration in order to understand what role specific factors have in contributing to the development of loneliness and aloneness and more specifically, a Negative Attitude to Solitude in youth. This is particularly important given the association of loneliness with mental health problems, predominantly depression, in rural youth [19, 26].

Importantly, it must be acknowledged that there was no demonstration of convergent and discriminant validity in the present study and further studies showing how the dimensions of the PALs relate to other expected traits is needed. Further, the effects of loneliness across situations seem important to investigate (e.g., loneliness at home, school, with peers). This must be a strong focus of future research if the usefulness of the PALs is to be established.

In terms of future studies, research should investigate whether the dimensions identified by the PALs are situational dependent or more enduring traits. Previous research has distinguished between state loneliness (i.e., current and immediate feelings of loneliness) and trait loneliness (i.e., a relatively enduring experience of loneliness) [19], while others [55] have added transient loneliness (i.e., brief and occasional feelings of loneliness that previously had satisfying relationships, usually activated by some specific crisis or life transition) as a consideration.

The current validation of the PALs means that child and adolescent psychiatrists, pediatric and clinical psychology specialists, and school based educators now have access to an easily administered self-report instrument that measures loneliness and which has the potential to offer new insights into prevention and intervention. It is clear that schools, in collaboration with allied health professionals, have an important role to play in implementing these early interventions [82]. Such a partnership might not only prevent the development of feelings of loneliness, but also prevent such feelings escalating to a point where young people feel the pain of having no friends to share thoughts with or to turn to in times of need. When this occurs, young people can become depressed or experience some other psychosomatic state, or even create a world view that does not need others. This can create a sense of “paralyzing hopelessness and unutterable futility” [83, p. 7] and lead to a sense of utter aloneness, an empty inner world, leading to feelings of emptiness, being dead, or hollowness [58]. The PALs not only provides professional groups with an instrument with which to identify adolescents who are at risk of these adverse outcomes but it also highlights the type of intervention these young people might require on the basis of where they are placed on the Friendship/Isolation (i.e., Loneliness) and Positive/Negative Attitude to Solitude dimensions.

In conclusion, our findings contribute to a developing body of research showing that loneliness among Australian adolescents is multidimensional. Furthermore, for some young people having time to spend by themselves is a positive aspect of their development. It has been argued that such time is a positive condition fostering identity formation, concentration, creativity, learning, and self-regulation [cf. 19]. Hence, the newly developed and validated instrument is a strong addition to current measures. This is important because it will allow for the development of more targeted and therefore more effective prevention and intervention strategies

and in doing so lead to a reduction in the myriad of adverse health related outcomes linked to loneliness.

Summary

The current study presented the psychometric qualities of a new 24-item self-report instrument (the Perth A-Loneness scale: PALs) specifically developed to measure multidimensional loneliness in Australian adolescents. Exploratory and confirmatory factor analyses conducted in a series of studies revealed four factors, Friendship, Isolation, Positive Attitude to Solitude, and Negative Attitude to Solitude. Each of these factors demonstrated satisfactory internal reliability. Overall, Australian adolescents reported that spending time on their own was beneficial, especially as they got older. Females reported having more reliable, trustworthy, and supportive friends compared to males, while Australian adolescents living in remote/rural locations experienced higher levels of the negative aspects of being alone compared to their metropolitan based peers. The PALs provides allied health professionals with a method of assessing the multidimensional aspects of loneliness in young people and also highlights the type of prevention/intervention strategy required on the basis of where they are placed on the four dimensions i.e., Friendship or Isolation (Loneliness) and Positive or Negative Attitude to Solitude (Aloneness). This increased opportunity for implementing more targeted interventions may reduce the myriad of associated adverse physical, psychological, social and mental health outcomes associated with loneliness.

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Table 1. Distribution of Study 1 sample by age and sex.

Age	Male	Female	Total
10	71	65	136
11	75	89	165
12	48	63	111
13	109	88	197
14	121	97	219
15	94	64	159
16	33	19	52
17	16	13	29
18	2	4	6
Totals	569	502	1074

Table 2. Factor loadings and correlations between the factors.

Factor 1: Friendship				
My friends will stand by me in almost any difficulty.	.84	.12	-.04	-.04
I can turn to my friends for help when I need it.	.82	.03	.01	.01
I get plenty of help and support from friends.	.76	-.01	.01	.00
I have friends that I can trust to do what they say they will do.	.69	-.05	.03	.01
Most of my friends are true friends.	.54	-.15	.01	.03
I feel part of a group of friends	.38	-.34	.05	.08
Factor 2: Isolation				
I have nobody to talk to.	.08	.77	.06	.05
I feel like I do not have a friend in the world.	.02	.71	-.07	.01
I am not close to anyone.	-.01	.69	-.01	-.10
No one cares much about me.	-.05	.56	.08	.08
I feel sad because I have no friends.	-.06	.52	-.04	.14
I do not have a close friend.	-.04	.50	-.03	-.06
Factor 3: Positive Attitude to Solitude				
I have discovered the benefits of being alone.	-.05	-.10	.69	.11
There are positive things about being lonely.	.02	-.02	.68	.07
There are benefits of being on my own.	.01	-.03	.67	-.02
I feel calm and relaxed when I'm by myself.	.10	-.03	.58	-.05
I feel happy when I'm all by myself.	.02	.11	.58	-.16
I want to be alone.	-.11	.22	.42	-.01
Factor 4: Negative Attitude to Solitude				
When I am by myself I feel lonely.	-.08	-.06	-.04	.67
When I am lonely, time seems to drag and I don't enjoy things.	.04	.01	.00	.67
When I get bored, I am unhappy.	-.04	-.10	.13	.62
When I am all by myself, I wish I had a friend to be with.	.11	.01	-.12	.51
If I feel lonely, I don't know what to do.	-.01	.24	.03	.50
I am unhappy being so isolated from others.	.04	.10	-.04	.33
Factor Correlation Matrix				
Friendship	1.00			
Isolation	-.61	1.00		
Positive Attitude to Solitude	-.05	.22	1.00	
Negative Attitude to Solitude	-.17	.36	-.25	1.00

Table 3. Fit indices for the Study 1 competing models and the Study Two model.

Model	χ^2	df	<i>p</i>	CMIN	NFI	CFI	RMSEA	CI
Study 1								
Four factor model: (Friendship, Isolation, Positive Attitude to Solitude, Negative Attitude to Solitude)	1396.257	246	.000	3.62	.90	.92	.05	.054 .059
One factor model	6395.813	252	.000	6.396	.52	.53	.129	.126 .132
Two factor model: (Friendship + Isolation, Positive Attitude to Solitude + Negative Attitude to Solitude)	3822.836	251	.000	15.23	.71	.73	.098	.096 .101
Three factor model: a) Friendship + Isolation, Positive Attitude to Solitude, Negative Attitude to Solitude	2436.704	249	.000	9.786	.82	.83	.077	.075 .080
b) Friendship, Isolation, Positive Attitude to Solitude + Negative Attitude to Solitude	2973.154	249	.000	11.940	.77	.79	.086	.084 .089
Study Two								
Four factor model: (Friendship, Isolation, Positive Attitude to Solitude, Negative Attitude to Solitude)	507.250	246	.000	2.062	.83	.92	.067	.059 .076

Table 4. Discrimination between Friendship and Isolation, and Positive and Negative Attitude to Solitude.

Friendship/Solitude Factors	Age in Years							
	10	11	12	13	14	15	16	17
Friendship and Isolation	-.57	-.61	-.58	-.56	-.52	-.54	-.58	-.55
Solitude	-.18	-.13	-.31	-.09	-.11	-.24	-.12	-.33

Table 5. Standardised regression weights for the Study 2 4 factor model (Study 1 Estimates in parentheses).

Item	Factor	Estimate
Friendship1: I feel part of a group of friends	F1	.71 (.65)
Friendship2: I can turn to my friends for help when I need it	F1	.76 (.75)
Friendship15: I get plenty of help and support from friends	F1	.87 (.86)
Friendship16: My friends will stand by me in almost any difficulty	F1	.88 (.84)
Friendship22: I have friends that I can trust to do what they say they will do	F1	.73 (.76)
Friendship24: Most of my friends are true friends	F1	.74 (.75)
Isolation8: I feel like I do not have a friend in the world	F2	.63 (.73)
Isolation9: I am not close to anyone	F2	.56 (.61)
Isolation13: I have nobody to talk to	F2	.72 (.70)
Isolation14: No one cares much about me	F2	.73 (.70)
Isolation17: I do not have a close friend	F2	.59 (.55)
Isolation23: I feel sad because I have no friends	F2	.58 (.57)
+ Solitude3: I feel calm and relaxed when I'm by myself	F3	.65 (.45)
+ Solitude4: I want to be alone	F3	.66 (.65)
+ Solitude11: There are positive things about being lonely	F3	.72 (.66)
+ Solitude12: I feel happy when I'm all by myself	F3	.80 (.73)
+ Solitude18: I have discovered the benefits of being alone	F3	.71 (.72)
+ Solitude20: There are benefits of being on my own	F3	.75 (.76)
- Solitude5: When I am by myself I feel lonely	F4	.82 (.67)
- Solitude6: If I feel lonely, I don't know what to do	F4	.66 (.63)
- Solitude7: When I am lonely, time seems to drag and I don't enjoy things	F4	.65 (.70)
- Solitude10: When I am all by myself, I wish I had a friend to be with	F4	.63 (.59)
- Solitude19: When I get bored, I am unhappy	F4	.50 (.48)
- Solitude21: I am unhappy being so isolated from others	F4	.51 (.46)
+ Positive Attitude to Solitude		
-Negative Attitude to Solitude		

Figure 1. Measurement model specifying four factors from the cross-validation sample

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