

## RESEARCH ARTICLE

# The Effects of Anxiety on Social Competence and Behavioural Adjustment in Preschoolers With Developmental Language Disorder

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## ABSTRACT

This study compared the social competence and emotional-behavioural adjustment of children aged 36–72 months with developmental language disorder (DLD) with those of typically developing peers (TD) and examined the relationship between anxiety disorders and these domains in the DLD group. The sample consisted of 229 children (92 DLD, 137 TD). Data were collected using the Social Competence and Behaviour Evaluation Scale-30 and the Preschool Anxiety Scale. Children with DLD exhibited lower social competence and higher anxiety-withdrawal and anger-aggression scores than their TD peers. In the DLD group, generalized anxiety and specific fears were negatively associated with social competence and positively associated with anxiety-withdrawal and anger-aggression. Social anxiety was negatively associated with social competence and positively associated with anxiety-withdrawal. Separation anxiety was positively associated with anxiety-withdrawal and anger-aggression. Regression analyses showed that social anxiety predicted anxiety-withdrawal, and generalized anxiety predicted anger-aggression. Moderation analysis determined that language development levels moderated the relationship between generalized anxiety and anger-aggression in children with DLD, such that generalized anxiety positively predicted anger-aggression, but this effect became weaker as language development levels increased. Children with DLD exhibit social-emotional and behavioural adjustment difficulties, with which anxiety symptoms are significantly associated. Intervention programs should consider anxiety symptoms when supporting the development of social and behavioural skills in children with DLD.

## 1 | Introduction

Language is a fundamental tool in children's interactions with their surroundings, their expression of their emotions and thoughts, and their regulation of social relationships (Hoff 2014). Early childhood is one of the periods when language development is most rapid and critical. During this time, children learn to express themselves, understand others and establish social relationships

by means of language (Hoff 2014). However, disruptions to language development in early childhood directly affect not only communication skills but also social, emotional and behavioural development (Conti-Ramsden and Botting 2008). Developmental language disorder (DLD) is a neurodevelopmental condition characterized by persistent problems in acquiring and using language independent of any known medical condition and that is capable of causing children to experience multidimensional difficulties in

their daily lives (Bishop et al. 2017). The prevalence of DLD in the preschool period is 8.5%, and delays in language development can significantly restrict children's establishment and maintenance of social relationships and their ability to exhibit appropriate behaviours in social settings (Hill et al. 2023).

Social competence refers to an individual's ability to enjoy successful social relationships, to behave in conformity with societal expectations, and to be able to communicate effectively in interpersonal relationships (Cavell 1990). In early childhood in particular, social competence is of critical importance in terms of peer relationships, interactions with teachers, and future social functioning (Denham et al. 2010). Indeed, frequently reported findings include the fact that children diagnosed with DLD experience difficulty in social initiatives, are rejected by peers and experience problems in establishing and maintaining friendships (García et al. 2021). This can also pave the way for the emergence of social isolation and emotional and behavioural difficulties as secondary problems (Conti-Ramsden and Botting 2008).

Recent research has shown that children diagnosed with DLD experience marked difficulties, not only in language skills but also in social-emotional development (Forrest et al. 2021). In addition to social, emotional and behavioural difficulties, anxiety is also more common in these school-age children with DLD, and anxiety can exacerbate the tendency to avoid social interactions (Burnley et al. 2023). This results in a vicious circle that further obstructs the development of social skills. While deficiencies in language skills exert adverse effects on social skills, increasing anxiety levels are thought to further impede social, emotional and behavioural development by restricting the child's participation in social settings (Brownlie et al. 2016; Edwards et al. 2010).

Studies examining the difference between typically developing (TD) children and those diagnosed with DLD in terms of social competence and behaviours have focused on the school age period and adolescence (Burnley et al. 2023; Brownlie et al. 2016; Wieczorek et al. 2023). However, the reflections of these differences in the preschool period and their association with anxiety have not been sufficiently addressed. To the best of the authors' knowledge, there is a lack of research in the literature examining the effects of anxiety on social competence and behavioural adaptation in preschool children with DLD. The evaluation of social competence and behaviours in preschool children with DLD and elucidating the association with anxiety is therefore important in terms of the early detection of developmental risks and of the planning of early interventions.

This research was designed to compare the social competence and emotional and behavioural adjustment of children aged 36–72 months diagnosed with DLD with those of TD and to examine the relationship between anxiety disorders and social competence and emotional and behavioural adjustment at the subdimension level in the DLD group. Our first hypothesis was that children with DLD exhibit lower social competence and greater anger and anxiety withdrawal behaviours than TD children. The second hypothesis was that a relationship exists between the anxiety disorder subdimensions and social competence and emotional and behavioural adjustment in children with DLD. The third hypothesis is that the level of language development in children with DLD moderates the effect of

anxiety on social competence and behavioural adjustment. We anticipate that the research findings will contribute to the development of holistic and multidiscipline intervention programs aimed at children diagnosed with DLD.

## 2 | Methods

### 2.1 | Study Population

The research was conducted as a cross-sectional case control study. The case group consisted of 92 children aged 36–72 months diagnosed with DLD referred to the Alanya Teaching and Research Hospital Child and Adolescent Psychiatry Clinic, Turkey. The diagnosis of DLD was made on the basis of comprehensive psychiatric assessments according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR). These included the use of the Denver Developmental Screening Test-II (DDST-II) as part of the standard clinical evaluation process to assess and quantify the level of language development. The control group (TD) consisted of 137 age- and gender-matched healthy children who presented to the healthy child clinic. In both groups, the DDST-II was administered. For the DLD group, it was utilized to quantify and grade the severity of the language development impairment as part of the diagnostic process. The DDST-II development coefficient (DQ) in the sphere of language development was calculated (Brown et al. 2020). All children in the DLD group had a DQ of  $-2$  SD or lower, consistent with the ICD-10 criteria for specific developmental disorders of speech and language (World Health Organization 1992). For the TD group, the DDST-II was utilized to screen for and rule out any developmental delays; all children in this group exhibited normal developmental profiles (DQ within normal limits) in all domains, including language. Anxiety, social competence and behaviour evaluation data were collected from the DLD group. Data concerning social competence and behaviour evaluation were collected from the TD group.

Children with psychiatric diagnoses and a history of DLD (with the exception of the case group), with neurological, genetic or metabolic diseases, with hearing loss, or with bilingualism or multilingualism, the children of parents who lacked the ability to read the forms and complete the scales, and those with 'abnormal' developmental levels in the fine motor and gross motor DDST-2 subtests were excluded from the case and control groups. Verbal and written consent was obtained from the participants' families. Approval for the study was granted by the Alanya Alaaddin Keykubat University clinical research ethical committee (No. 2024/04 dated 11.06.2024).

### 2.2 | Psychometric Instruments

#### 2.2.1 | Denver Developmental Screening Test II (DDST-II)

This developmental screening test was developed by Frankenburg and colleagues (Frankenburg et al. 1992). It is widely used in clinical practice to identify potential developmental problems in children. The test can be administered to

children under the age of six and assesses four key developmental domains: fine motor skills, gross motor skills, language skills and social skills. Its adaptation into Turkish and standardization studies have previously been conducted (Anlar and Yalaz 1996). The development quotient (DQ) was calculated using the test scores obtained from the language development domain, using the formula (developmental age / chronological age)  $\times$  100 (Brown et al. 2020).

### 2.2.2 | Social Competence and Behaviour Evaluation Scale-30 (SCBE-30)

One of the principal measurement tools used to identify children at risk in the early childhood and preschool periods, this scale was developed by LaFreniere and Dumas (LaFreniere and Dumas 1996). SCBE-30 evaluates preschool children's social competence and behavioural adjustment and consists of three subscales of 10 items each. These subscales are social competence (SC), Anxiety-Withdrawal (AW) and anger-aggression (AA). Children's emotional and behavioural problem symptoms and social skills are evaluated using a six-point Likert-type scale (1 = *never*, 6 = *always*). SCBE-30 can be completed by parents or teachers. It has no cut-off point. The validity and reliability of the Turkish-language version have previously been confirmed (Çorapçı et al. 2010).

### 2.2.3 | The Preschool Anxiety Scale

This scale was developed by Spence and Rapee to evaluate anxiety in preschool children (Edwards et al. 2010). It consists of 30 items scored on a five-point Likert-type scale (0 = *not true at all*, 4 = *very often true*). It has four sub-dimensions: social anxiety (SOC), separation anxiety (SEP), specific fears (SPC) and generalized anxiety (GA) (Edwards et al. 2010). The scale has no cut-off point, but higher total and subscale scores indicate higher levels of anxiety in the relevant factors. The validity and reliability of the Turkish language version have previously been confirmed (Uğraş et al. 2018).

## 2.3 | Statistical Analysis

The non-random convenience sampling method was employed due to its time-related advantage. For continuous data, mean and standard deviation were calculated. For categorical data, numbers and percentages were calculated. The presence of inter-group differences was examined using the independent samples *t* test (the Welch test since variances were not homogeneously distributed) and the chi-square test. Correlations between variables were examined using Pearson's correlation coefficients in the case of normal distribution, and Spearman's correlation tests if normal distribution was violated. Since no data concerning anxiety symptoms were collected from the TD group, relationships between the anxiety subscales and social competence and behavioural adjustment were only examined in the DLD group. Regression models were tested for the outcome variables of social competence, anger-aggression and anxiety-withdrawal for the DLD group, with age, gender and preschool anxiety scores as predictors. Moderation analyses were performed using Jamovi

version 2.6.26 to examine whether language development level (moderator) moderated the associations between anxiety subdimensions (independent variables: GA, SOC, SPC and SEP) and social competence, anger-aggression and anxiety-withdrawal (dependent variables). Simple slope analyses were conducted to interpret significant interactions. Statistical analysis was conducted on SPSS Version 27.0 software and Jamovi Version 2.6.26.

## 3 | Results

No difference was determined between the DLD and TD groups in terms of gender ( $X^2 [1.229] = 2.583$ ,  $p = 0.108$ ) or age ( $t [229] = 1.490$ ,  $p = 0.138$ ). There was also no significant difference between the two groups in terms of maternal age ( $p = 0.978$ ), paternal age ( $p = 0.146$ ), maternal education level ( $p = 0.596$ ), paternal education level ( $p = 0.333$ ), number of siblings ( $p = 0.593$ ), birth order ( $p = 0.121$ ) or monthly family income ( $p = 0.159$ ). Receipt of preschool education was significantly lower in the DLD group (62.0%) than in the TD group (86.9%) ( $p < 0.001$ ). This difference was supported by a medium effect size (Cramér's  $V = 0.29$ ). Mean SC scores were significantly lower in the DLD group than in the TD group ( $p = 0.011$ ), while AA and AW scores were significantly higher in the DLD group ( $p = 0.009$  and  $p = 0.018$ , respectively). These results indicate a small-to-medium effect size (Cohen's  $d$  values 0.342, 0.369 and 0.318, respectively) (Table 1).

Descriptive scale statistics are shown in Table 2. Total preschool anxiety and subscale scores in the DLD group were normally distributed, with the exception of SEP (skewness/kurtosis values in the  $\pm 1.0$  range). The GA subdimension was significantly negatively correlated with SC ( $p = 0.038$ ) and significantly positively correlated with AA ( $p = 0.001$ ) and AW ( $p = 0.001$ ). The SOC subdimension was significantly negatively correlated with SC ( $p = 0.022$ ) and significantly positively correlated with AW ( $p < 0.001$ ). The SPC subdimension was significantly negatively correlated with SC ( $p = 0.025$ ) and significantly positively correlated with AA ( $p = 0.041$ ) and AW ( $p = 0.008$ ). SEP exhibited no correlation with SC ( $p = 0.143$ ) but registered significant positive correlations with AA and AW ( $p < 0.001$  and  $p = 0.016$ , respectively) (Table 2).

We planned to test three distinct multiple regression models in the DLD group, with SC, AA and AW scores as dependent variables and age, sex, preschool education and GA, SOC, SPC and SEP scores as predictors. Basic statistical assumptions were tested before the regression analyses. In light of visual examinations, the linear relationship assumption was established, and no multicollinearity problems were observed ( $VIF = 1.015$ – $2.28$ ). The normality of the residuals and fixed variances (homoscedasticity) were assessed using graphical methods, and the assumptions were again met. The Durbin–Watson (DW) test results revealed no autocorrelation between the residuals (DW values for SC, AA and AW were 1.93, 2.31 and 2.27, respectively). In light of these findings, the regression models obtained were regarded as being beneath basic assumptions.

The model in which social competence represented the dependent variable was not significant ( $F [7.84] = 1.75$ ,  $p = 0.107$ ). The second model, in which anger-aggression was the dependent variable, was significant (adjusted  $R^2 = 0.169$ ,  $F [7.884] = 3.64$ ,

**TABLE 1** | A comparison of the DLD and TD groups.

|                       |                   | DLD (N=92)    | TD (N=137)   |                     |                    |              |
|-----------------------|-------------------|---------------|--------------|---------------------|--------------------|--------------|
|                       |                   | Mean ± SD     | Mean ± SD    |                     |                    |              |
|                       |                   | N (%)         | N (%)        |                     |                    |              |
|                       |                   | Med (Q1–Q3)   | Med (Q1–Q3)  | t/Z/X <sup>2</sup>  | ES                 | p            |
| Age (month)           |                   | 58.08 ± 7.81  | 59.56 ± 7.11 | 1490 <sup>a</sup>   | 0.198 <sup>d</sup> | 0.138        |
| Sex                   | Female            | 28 (30.4)     | 56 (40.9)    | 2583                | 0.106 <sup>e</sup> | 0.108        |
|                       | Male              | 64 (69.6)     | 81 (59.1)    |                     |                    |              |
| Preschool education   | Yes               | 57 (62.0)     | 119 (86.9)   | 19.192              | 0.289 <sup>e</sup> | <0.001       |
|                       | No                | 35 (38.0)     | 18 (13.1)    |                     |                    |              |
| Number of siblings    |                   | 2 (2–3)       | 2 (2–3)      | −0.534 <sup>c</sup> | 0.035 <sup>f</sup> | 0.593        |
| Birth order           |                   | 2 (1–2)       | 1 (1–2)      | −1549 <sup>c</sup>  | 0.102 <sup>f</sup> | 0.121        |
| Maternal age          |                   | 33.66 ± 5.97  | 33.64 ± 5.18 | 0.028 <sup>a</sup>  | 0.003 <sup>d</sup> | 0.978        |
| Paternal age          |                   | 38.64 ± 6.10  | 37.39 ± 6.44 | 1458 <sup>a</sup>   | 0.199 <sup>d</sup> | 0.146        |
| Maternal education    | Primary education | 33 (35.9)     | 49 (35.8)    | 1035                | 0.047 <sup>e</sup> | 0.596        |
|                       | High school       | 34 (37.0)     | 58 (42.3)    |                     |                    |              |
|                       | University        | 25 (27.2)     | 30 (21.9)    |                     |                    |              |
| Paternal education    | Primary education | 34 (37.0)     | 38 (27.7)    | 2202                | 0.069 <sup>e</sup> | 0.333        |
|                       | High school       | 36 (39.1)     | 60 (43.8)    |                     |                    |              |
|                       | University        | 22 (23.9)     | 39 (28.5)    |                     |                    |              |
| Family monthly income | Less than MW      | 11 (12.5)     | 8 (5.8)      | 5184                | 0.087 <sup>e</sup> | 0.159        |
|                       | 1–2 MW            | 45 (51.1)     | 64 (46.7)    |                     |                    |              |
|                       | 2–3 MW            | 21 (23.9)     | 37 (27.0)    |                     |                    |              |
|                       | Above 4 MW        | 11 (12.5)     | 28 (20.4)    |                     |                    |              |
| Social competence     |                   | 41.42 ± 11.49 | 45.07 ± 9.79 | 2577 <sup>b</sup>   | 0.342 <sup>d</sup> | <b>0.011</b> |
| Anger-aggression      |                   | 24.99 ± 9.29  | 22.07 ± 6.26 | −2643 <sup>b</sup>  | 0.369 <sup>d</sup> | <b>0.009</b> |
| Anxiety-withdrawal    |                   | 20.37 ± 8.24  | 17.92 ± 7.14 | −2391 <sup>a</sup>  | 0.318 <sup>d</sup> | <b>0.018</b> |

Note: Significant results are shown in bold.

Abbreviations: DLD, developmental language disorder; ES, effect size; MW, minimum wage; TD, typically developing children.

<sup>a</sup>Independent sample *t* test,

<sup>b</sup>Welch's test,

<sup>c</sup>Mann–Whitney U test, chi-square test,

<sup>d</sup>Cohen's *d*,

<sup>e</sup>Cramer's *V* and

<sup>f</sup>*r*: (*r* calculated from *Z* value).

**TABLE 2** | Correlations between total preschool anxiety and subscale descriptive statistics and social competence, anger-aggression and anxiety-withdrawal in the DLD group.

|     | Mean ± SD     | Skew  | Kurt   | Social competence           | Anger-aggression                     | Anxiety-withdrawal                  |
|-----|---------------|-------|--------|-----------------------------|--------------------------------------|-------------------------------------|
|     | Med (min–max) |       |        | <i>r</i> ( <i>p</i> )       | <i>r</i> ( <i>p</i> )                | <i>r</i> ( <i>p</i> )               |
| GA  | 9.02 ± 5.48   | 0.202 | −0.917 | −0.216 ( <b>0.038</b> )     | 0.354 ( <b>0.001</b> )               | 0.348 ( <b>0.001</b> )              |
| SOC | 7.28 ± 5.18   | 0.710 | 0.024  | −0.239 ( <b>0.022</b> )     | 0.156 (0.137)                        | 0.508 (< <b>0.001</b> )             |
| SPC | 10.91 ± 6.75  | 0.640 | −0.080 | −0.234 ( <b>0.025</b> )     | 0.214 ( <b>0.041</b> )               | 0.277 ( <b>0.008</b> )              |
| SEP | 5.53 (0–20)   | 1.120 | 1.420  | −0.154 <sup>a</sup> (0.143) | 0.370 <sup>a</sup> (< <b>0.001</b> ) | 0.251 <sup>a</sup> ( <b>0.016</b> ) |
| TAS | 32.75 ± 17.32 | 0.414 | −0.444 | −0.256 ( <b>0.014</b> )     | 0.324 ( <b>0.002</b> )               | 0.449 (< <b>0.001</b> )             |

Note: Pearson correlations coefficients.

<sup>a</sup>Spearman's rho; Med: Median; SD: standard deviation; Min: minimum; Max: maximum; Skew: skewness; Kurt: kurtosis; SOC: Social anxiety; SAD: separation anxiety; SPC: specific fears; GA: generalized anxiety; TAS: total anxiety scores; DLD: developmental language disorder. Significant results are shown in bold.

**TABLE 3** | Multilinear regression results for the dependent variables of social competence, anger-aggression and anxiety-withdrawal in the DLD group.

| DV                                                                    | Predictor                     | B (95% CI [LB-UB])       | $\beta$ | <i>t</i> | <i>p</i>          |
|-----------------------------------------------------------------------|-------------------------------|--------------------------|---------|----------|-------------------|
| Anger-aggression                                                      | Age                           | −0.138 (−0.389 to 0.113) | −0.116  | −1.096   | 0.276             |
|                                                                       | Sex (ref female)              | 3.500 (−0.598 to 7.599)  | 0.377   | 1.698    | 0.093             |
|                                                                       | Preschool education (ref yes) | 2.962 (−0.978 to 6.903)  | 0.319   | 1.495    | 0.139             |
|                                                                       | GA                            | 0.678 (0.192 to 1.164)   | 0.400   | 2.773    | <b>0.007</b>      |
|                                                                       | SOC                           | −0.256 (−0.700 to 0.189) | −0.142  | −1.143   | 0.256             |
|                                                                       | SPC                           | 0.148 (−0.192 to 0.487)  | 0.107   | 0.865    | 0.390             |
|                                                                       | SEP                           | 0.112 (−0.424 to 0.647)  | 0.053   | 0.415    | 0.679             |
| <i>R</i> <sup>2</sup> Adj = 0.169 ( <i>N</i> = 92, <i>p</i> = 0.002)  |                               |                          |         |          |                   |
| Anxiety-withdrawal                                                    | Age                           | 0.044 (−0.170 to 0.258)  | 0.042   | 1.329    | 0.187             |
|                                                                       | Sex (ref female)              | 2.582 (−0.914 to 6.077)  | 0.313   | 1.469    | 0.146             |
|                                                                       | Preschool education (ref yes) | 0.989 (−2.372 to 4.350)  | 0.120   | 0.585    | 0.560             |
|                                                                       | GA                            | 0.064 (−0.351 to 0.479)  | 0.043   | 0.306    | 0.760             |
|                                                                       | SOC                           | 0.674 (0.295 to 1.053)   | 0.423   | 3.534    | <b>&lt; 0.001</b> |
|                                                                       | SPC                           | 0.080 (−0.210 to 0.369)  | 0.065   | 0.547    | 0.586             |
|                                                                       | SEP                           | 0.081 (−0.375 to 0.538)  | 0.044   | 0.355    | 0.724             |
| <i>R</i> <sup>2</sup> Adj = 0.233 ( <i>N</i> = 92, <i>p</i> < 0.001). |                               |                          |         |          |                   |

Note: DV: dependent Variable; B: unstandardized coefficients;  $\beta$ : standardized coefficients; 95% CI (LB-UB): 95% confidence interval (lower bound–upper bound); Adj: adjusted; SOC: social anxiety; SAD: separation anxiety; SPC: specific fears; GA: generalized anxiety; DLD: developmental language disorder. Gender was coded as 0 for female and 1 for male. Preschool education was coded as 1 for yes and 0 for no. Significant results are shown in bold.

**TABLE 4** | Moderation analysis for the effect of language development on the relationship between generalized anxiety and anger-aggression.

|                                                | Estimate | SE     | 95% CI  |          | <i>z</i> | <i>p</i>          |
|------------------------------------------------|----------|--------|---------|----------|----------|-------------------|
|                                                |          |        | Lower   | Upper    |          |                   |
| Generalized anxiety                            | 0.7365   | 0.1673 | 0.4087  | 1.06432  | 4.40     | <b>&lt; 0.001</b> |
| Language development level                     | 0.1257   | 0.0758 | −0.0229 | 0.27438  | 1.66     | 0.097             |
| Generalized anxiety*language development level | −0.0292  | 0.0142 | −0.0570 | −0.00135 | −2.05    | <b>0.040</b>      |

Note: SE: standard error; 95% CI: 95% confidence interval. Significant results are shown in bold.

*p* = 0.002). In that model, only GA results significantly positively predicted anger-aggression ( $\beta$  = 0.400, *p* = 0.007). The third model, in which anxiety-withdrawal was the dependent variable, was also significant (*F* [7.84] = 4.94, *p* < 0.001). Approximately 23% of the variance in the anxiety-withdrawal dependent variable was explained by the predictor variables in that model (adjusted *R*<sup>2</sup> = 0.233). According to the model, preschool SOC scores predict the anxiety-withdrawal variable in a powerful and significant manner ( $\beta$  = 0.423, *p* < 0.001) (Table 3).

In addition, moderation analysis was performed in order to test the moderating effect of language development levels in the relationships between anxiety subdimensions and SC, AA and AW in the DLD group. These analyses showed that language development level only exhibited a moderator effect in the relationship between the GA subdimension and AA ( $\beta$  = −0.0292, SE = 0.0142, *p* = 0.040) (Table 4). No statistically significant interaction was

determined in other moderation analyses (*p* > 0.05) (Table 5). Simple slope analyses revealed that generalized anxiety was a significant positive predictor of anger-aggression at all levels of language development (low, average and high). However, the strength of this positive prediction was strongest at low levels of language ability (−1 SD;  $\beta$  = 1.072, SE = 0.269, *p* < 0.001) and became progressively weaker at average ( $\beta$  = 0.736, SE = 0.171, *p* < 0.001) and high levels (+1 SD;  $\beta$  = 0.401, SE = 0.202, *p* = 0.047) (Table 6). This finding suggests that the positive effect of generalized anxiety on anger-aggression is reduced as language skills improve in the DLD group (Figure 1).

#### 4 | Discussion

The number of studies examining social competence and behavioural adjustment in children with DLD in preschool

**TABLE 5** | The moderating effect of level of language development on the relationship between anxiety subdimensions and social-behavioural outcomes in DLD.

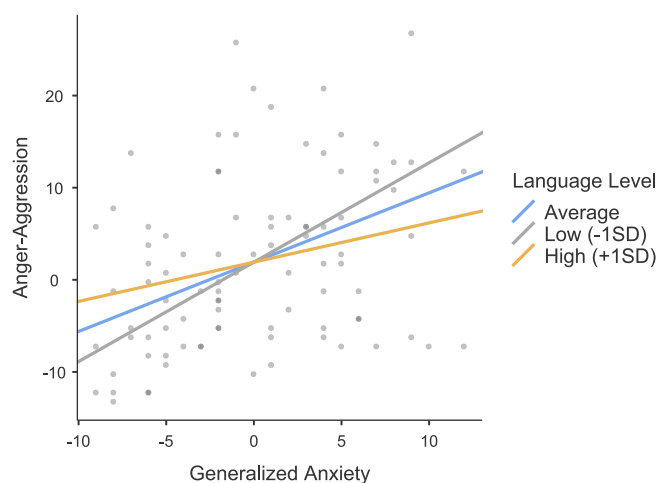
| Predictor           | Dependent variable | Interaction term                | $\beta$        | SE            | Z            | p            |
|---------------------|--------------------|---------------------------------|----------------|---------------|--------------|--------------|
| Generalized anxiety | Social competence  | Generalized anxiety $\times$ LD | 0.0304         | 0.0183        | -2.89        | 0.097        |
| Social anxiety      | Social competence  | Social anxiety $\times$ LD      | 0.0149         | 0.0181        | 0.824        | 0.410        |
| Specific fears      | Social competence  | Specific fears $\times$ LD      | -0.0102        | 0.0159        | -0.644       | 0.520        |
| Separation anxiety  | Social competence  | Separation anxiety $\times$ LD  | 0.0170         | 0.0218        | 0.78         | 0.435        |
| Generalized anxiety | Anxiety-withdrawal | Generalized anxiety $\times$ LD | 0.00929        | 0.00130       | 0.718        | 0.473        |
| Social anxiety      | Anxiety-withdrawal | Social anxiety $\times$ LD      | 0.00166        | 0.0116        | 0.0142       | 0.989        |
| Specific fears      | Anxiety-withdrawal | Specific fears $\times$ LD      | 0.00187        | 0.0114        | 0.164        | 0.870        |
| Separation anxiety  | Anxiety-withdrawal | Separation anxiety $\times$ LD  | -0.00356       | 0.0150        | -0.238       | 0.812        |
| Generalized anxiety | Anger-aggression   | Generalized anxiety $\times$ LD | <b>-0.0292</b> | <b>0.0142</b> | <b>-2.05</b> | <b>0.040</b> |
| Social anxiety      | Anger-aggression   | Social anxiety $\times$ LD      | 0.00159        | 0.0151        | 0.106        | 0.916        |
| Specific fears      | Anger-aggression   | Specific fears $\times$ LD      | 0.00965        | 0.00131       | 0.352        | 0.460        |
| Separation anxiety  | Anger-aggression   | Separation anxiety $\times$ LD  | 0.00668        | 0.0170        | 0.394        | 0.694        |

Abbreviations: LD: language development level; SE: standard error. Significant results are shown in bold.

**TABLE 6** | Simple slopes of the relationship between generalized anxiety and anger-aggression at different levels of language development.

| Language development level | Estimate | SE    | 95% confidence interval |       | Z    | p                 |
|----------------------------|----------|-------|-------------------------|-------|------|-------------------|
|                            |          |       | Lower                   | Upper |      |                   |
| Average                    | 0.736    | 0.171 | 0.40155                 | 1.071 | 4.31 | <b>&lt; 0.001</b> |
| Low (-1 SD)                | 1.072    | 0.269 | 0.054578                | 1.599 | 3.99 | <b>&lt; 0.001</b> |
| High (+1 SD)               | 0.401    | 0.202 | 0.00442                 | 0.797 | 1.98 | <b>&lt; 0.047</b> |

Note: Significant results are shown in bold.

**FIGURE 1** | The moderating effect of language development level on the relationship between general anxiety and anger-aggression in DLD.

children is limited. To the best of our knowledge, this study is the first to investigate the relationship between anxiety subdimensions and social competence and behavioural adjustment in preschool children with DLD. The study findings revealed lower preschool education, lower social competence

and higher anxiety-withdrawal and anger-aggression in children with DLD compared to TD. They indicate relationships between anxiety disorders and social competence and behavioural adjustment in children with DLD. In addition, they show that generalized anxiety disorder positively predicts anger-aggression behaviours, while social anxiety positively predicts anxiety-withdrawal behaviours in these children. Finally, the level of language development in children with DLD played a moderating role in the effect of generalized anxiety on anger-aggression. The findings of this study support our first hypothesis, that social competence would be lower, while anxiety-withdrawal and anger-aggression would be higher in preschool children with DLD. They also support our second hypothesis regarding an association between anxiety subdimensions and social competence and behaviours in children with DLD, thus making an important contribution towards a better understanding of the social, emotional and behavioural development of children with DLD. The third hypothesis, that the level of language development in children with DLD moderates the effect of anxiety on social competence and behavioural adjustment, was also partially confirmed.

Children with DLD may be disadvantaged in social interactions due to difficulties they experience due to the receptive and/or expressive components of language (Hill et al. 2023). The

evaluation of the social competence levels of children with DLD is of critical importance from that perspective (Cavell 1990). Children with DLD in late childhood and early adolescence have been reported to exhibit lower social competence than TD (Wieczorek et al. 2023). Horwitz et al. reported an association between language delay and social competence in early childhood (Horowitz et al. 2007). Another study reported that preschool children with language impairment inferred/understood facial expressions of emotion more slowly, and therefore indirectly exhibited lower social competence, and that their low emotion recognition skills predicted social competence (Ford and Milosky 2008). The results of this study are consistent with the literature, lower social competence scores being determined in children with DLD compared to those with TD. These findings show that the social competence of children with DLD may be at risk.

In addition to communication, children with language disorder also experience emotional and behavioural difficulties (Burnley et al. 2023). Research involving children in early childhood has shown that social and emotional development in children with language impairment lags behind those of TD (Aarne et al. 2013). A study examining conflict behaviour in naturalistic preschool settings in children with language impairment reported that children with such impairment exhibited difficulty in managing their behaviours compared to TD and were more aggressive (Horowitz et al. 2007). Children with DLD aged 6–12 years have been shown to exhibit greater emotional dysregulation and behavioural difficulties than TD (Burnley et al. 2023). The present study also determined greater anger-aggression and anxiety-withdrawal in children with DLD compared to TD. The results of the present research indicate that problems in language development in children with DLD can significantly affect not only their communication skills but also their emotional and behavioural development. This in turn highlights the importance of integrated interventional approaches directed towards both language skills and also emotional-behavioural regulation.

Previous research has shown that children with DLD are at risk in terms of both emotional and behavioural problems (Conti-Ramsden and Botting 2008) and that they experience difficulties in regulating emotion (Burnley et al. 2023). Although anxiety is more common in children with DLD (Burnley et al. 2023), studies examining the relationship between behavioural problems and anxiety sub-dimensions are scarce. From that perspective, the findings of this study will yield a more detailed understanding of behavioural problems in children with DLD by considering the heterogeneous nature of anxiety. A previous study addressing the relationship between general anxiety disorder and aggression reported that individuals with general anxiety disorder possessed lower levels of ability to control anger-related emotions and greater levels of trait anger, externalized anger expression and internalized anger expression (Erdem et al. 2008). Another study showed that the severity of impairment in generalized anxiety symptoms was associated with physical and verbal aggression, anger and hostility (Deschênes et al. 2012). In agreement with previous studies, generalized anxiety symptoms also predicted anger-aggression in children with DLD in the present research. Emotion regulation difficulties may represent the basic mechanism underlying this relationship. Anxiety creates an intensive troubling state of emotional arousal (Cisler

et al. 2010). Due to their limitations in language skills, children with DLD experience greater difficulty in interpreting and regulating this emotional state (Fujiki et al. 2002). Difficulties in emotion regulation are frequently seen in children with anxiety disorder (Suveg and Zeman 2004; Hurrell et al. 2015). Previous studies have reported that anxious children experience a greater intensity of negative emotions, express these in a more irregular manner and exhibit inappropriate strategies in coping with these emotions (Suveg and Zeman 2004; Hurrell et al. 2015). Since language is an essential tool for emotion regulation, children with DLD are disadvantaged in this process (Cole et al. 2010). As generalized anxiety increases in a child with DLD, it therefore comes to represent an emotional burden that is difficult to cope with, and unless regulated, that burden can be expressed by means of anger and aggression.

One important finding of this study is that the level of language development in children with DLD moderates the association between generalized anxiety and anger-aggression behaviours. The analyses showed that the effect of generalized anxiety on anger-aggression decreases as the level of language development increases. This moderator effect can be explained through the role of language in emotion regulation (Roben et al. 2013; Eisenberg et al. 2005). Language contributes to emotion regulation by allowing the child to understand emotion, express it verbally and develop regulatory strategies such as seeking help and distraction (Fujiki et al. 2002; Cole et al. 2010; Roben et al. 2013). For example, a study involving preschool children reported that children with better language skills sought more assistance from their parents and exhibited less anger during moments of distress in a delay task (Roben et al. 2013). In conclusion, more highly developed language skills in children with DLD can reduce the effect of generalized anxiety on aggressive behaviour by contributing to emotion regulation. Notably, however, the level of language development in children with DLD in this study had no significant direct effect on anger and aggressive behaviour. Inconsistent results have been reported in the literature in this context (Horowitz et al. 2007; De Giacomo et al. 2016; Girard et al. 2014). However, in agreement with the present research, some previous studies have determined no direct association between language skills and aggression (De Giacomo et al. 2016; Girard et al. 2014). A study conducted in the general population suggested that the relationship between language development levels and aggression was only a weak and transient one between 17 and 41 months and that no significant association was observed in subsequent periods (up to 72 months) (Girard et al. 2014). Another study, involving children with autism, determined no association between aggression and language development (De Giacomo et al. 2016). Rather than being general in nature, the principal effect of language development on aggression therefore appears to be a process specifically associated with generalized anxiety. All these findings show that rather than being direct, the effect of language skills on anger-aggression occurs via a buffering mechanism in processes associated with generalized anxiety in particular.

Another finding of this study is that social anxiety symptoms in children with DLD predict anxiety-withdrawal behaviours. Recent research has shown that school-age children with DLD exhibit greater social withdrawal behaviours than their TD (Ahufinger et al. 2025). There is increasing evidence that this

pattern of withdrawal in school age can also be seen in the preschool period. A recent longitudinal study of children aged 2–4 years who had newly begun to walk reported that those with DLD exhibited more withdrawal behaviours than their TD counterparts (Lu et al. 2022). Such experiences reinforce social anxiety and may therefore play an important role in the emergence of withdrawal behaviours (Ahufinger et al. 2025). A previous prospective study showed that children experiencing language impairments in the preschool period also experience higher levels of social anxiety in adolescence and adulthood than their TD (Brownlie et al. 2016). Withdrawal behaviours in preschool children with DLD may represent an early indicator of social anxiety disorder. Identifying and addressing these behaviours in early childhood may therefore be of critical importance in preventing social anxiety symptoms and associated functional impairments from worsening over time.

This study investigated the relationship between anxiety sub-dimensions and social competence in children with DLD. The findings indicated the presence of a relationship between the two variables. However, anxiety sub-dimensions were not capable of predicting social competence. Studies investigating the associations between anxiety disorders and social competence have largely involved individuals with autism spectrum disorder (ASD) and have focused on social anxiety. A relationship has been reported between social competence and anxiety in children with ASD and DLD, but not in TD (Mylett et al. 2023). Another study reported an association between social anxiety and social competence in children with ASD, but that this may vary depending on age (Adams et al. 2023). General anxiety symptoms have been shown to predict social competence in children with ASD after considering IQ (intelligence quotient), age and gender (Johnston and Iarocci 2017). Social competence is too complex and multidimensional to be capable of being explained by anxiety alone. Factors affecting social competence include IQ, language skills, parental support, peer relationships and social skills education (Rose-Krasnor 1997). Only types of anxiety were included in the model in the present study, while other variables such as parental support were excluded, and this may have resulted in social competence not being sufficiently explained in the regression analysis. Future research should involve a more comprehensive model in which both individual and environmental factors are included, thus yielding a more in-depth understanding of the mechanisms underlying social competence in children with DLD.

This study has a number of limitations. First, social competence and anxiety variables were evaluated using scales relying on parental observations, and such subjective measurements may entail a risk of bias and evaluation error. In addition, due to the cross-sectional nature of the research, it is difficult to draw conclusions concerning cause and effect relationships between variables. Longitudinal studies may provide a better idea of the time-related dynamics of the development of social competence and anxiety. Second, social and environmental variables such as intrafamily factors (parental education and details of socioeconomic status), teacher behaviours and peer relationships were not brought under control. These factors may also affect social competence and anxiety. Moreover, the fact that data concerning anxiety were not collected for the TD group means that relationships between anxiety and social competence and behavioural

adjustment could only be investigated in the DLD group. This may have restricted the generalizability of the results. In addition, the fact that a control group with specific exclusion criteria was selected may have limited the extent to which the sample represents the general population. Despite enhancing internal validity, this approach may also reduce the generalizability of the findings to real-life conditions.

This research revealed lower social competence levels and greater behavioural adjustment problems in children aged 36–72 months diagnosed with DLD compared to TD. It also determined an association between anxiety subdimensions and behaviours in the DLD group. The study findings show that language disorders have important effects not only on communication development but also on behavioural and emotional development. From that perspective, we recommend that intervention programs for children with DLD should include social skills and coping with anxiety strategies rather than language development alone. The implementation of multidimensional and integrative support programs in early childhood may improve these children's social participation and reduce the risks of long-term socio-emotional difficulties.

### Author Contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Orhan Kocaman, Orgül Yıldız Özşan, Umut Mert Kılıç, Tayfun Kara, Pınar Aydoğan Avşar and Tacettin Kuru. The first draft of the manuscript was written by Orhan Kocaman, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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The authors have nothing to report.

### Ethics Statement

Approval for the study was granted by the Alanya Alaaddin Keykubat University clinical research ethical committee (No. 2024/04 dated 11.06.2024). This study was conducted in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

### Consent

Verbal and written consent was obtained from the participants' families. No material was taken from another study.

### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

Research data are stored in an institutional repository and will be shared with the corresponding author upon request.

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