



Life Satisfaction in Adolescents with Autism Spectrum Disorder

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Abstract

We provided evidence regarding the reliability and validity of measures of assets and life satisfaction (LS) for adolescents with autism spectrum disorder (ASD). We identified levels of LS within this population, compared these levels to those of typically developing adolescents, and described the relation between assets and LS. Forty-six adolescents with ASD and their caregivers completed questionnaires assessing LS and assets. Preliminary support was provided for the internal consistency reliability and validity of these measures in adolescents with ASD. Youth with ASD reported moderate to high levels of LS; these were lower than those of typically developing peers. Age moderated the relation between self-reported LS and some assets. Implications were discussed within the context of Schalock's (J Disabil Policy Stud 14:204–215, 2004) emerging disability paradigm.

Keywords Autism spectrum disorder · High-functioning autism spectrum disorder · Adolescence · Life satisfaction · Psychosocial assets · Positive psychology

Our study addressed the reliability and validity of measures of life satisfaction (LS) and psychosocial assets in adolescents with autism spectrum disorder (ASD), as well as assessed levels of LS and examined the relations between assets and LS within this population. Research has demonstrated that children and adolescents with ASD experience increased risk for aggression, anxiety, and depression when compared to their typically developing (TD) peers without ASD (Boonen et al. 2014; Simonoff et al. 2008). However, research has not adequately examined positive outcomes, such as LS, and predictors within this population. Positive functioning should also be examined to provide a more comprehensive view of adolescents with ASD.

ASD is a neurodevelopmental disability that is characterized by deficits in social communication and social interaction, such as deficits in nonverbal communication, failure to develop peer relationships, or difficulty maintaining conversations, as well as stereotyped behaviors (American Psychiatric Association 2013). It is estimated that 7.60 of

every 1000 individuals worldwide meet criteria for ASD, with more males affected than females (Baxter et al. 2015).

Our study was informed by the emerging disability paradigm (Schalock 2004). According to the emerging disability paradigm, research and clinical practice with individuals with disabilities should emphasize positive experiences, positive personality, and people and experiences embedded within social contexts (Schalock 2004). The positive experiences domain refers to positive emotions and LS, which is one's cognitive appraisal of satisfaction with life circumstances (Diener 1984). The positive personality domain refers to internal assets, such as self-efficacy, gratitude, and optimism. Assets are strong predictors of LS within TD adolescents (Furlong et al. 2014). Assets may also be amenable to intervention to improve overall LS (Furlong et al. 2014; Proctor et al. 2011). Finally, the social context domain refers to external assets, such as positive relationships and social support; high levels of support are strong predictors of LS for TD adolescents (Furlong et al. 2014). Research emphasizing these domains offers a more comprehensive perspective of adolescents with ASD than does a deficit-focused model, and it may provide practical information regarding the promotion of optimal outcomes.

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LS in Adolescents

The construct of LS addresses individuals' subjective appraisals of their lives, either overall or with specific dimensions (e.g., family, friends, school; Huebner 1994). LS is related to a variety of positive outcomes for adolescents. Suldo and Huebner (2004) found that LS moderated the relation between stressful life events and externalizing behavior problems for adolescents, such that high levels of LS buffered students from the negative effects of stressful events. In addition to protecting against externalizing behaviors, high LS may protect against internalizing problems for adolescent boys (Lyons et al. 2014). LS is also an indicator of positive outcomes. In a longitudinal study of pre-adolescents' LS, Tolan and Larsen (2014) found that students who maintained high levels of LS for 6 months were rated by their teachers as having greater social and leadership skills than students whose LS decreased. LS is thus an important protective factor and an indicator of positive functioning for TD adolescents.

While research demonstrates benefits of high LS for TD adolescents, previous studies also indicate that adolescents' self-reported LS and caregivers' estimates of adolescents' LS correlate moderately. For example, Dew and Huebner (1994) observed a moderate relation ($r = 0.48$) between caregiver estimates and TD adolescents' self-reported LS. Similarly, Gilman and Huebner (1997) detected a correlation of 0.54 for caregiver estimates and middle school students' self-reported LS. These findings suggest that caregivers and adolescents have overlapping, but separable perspectives regarding youth's LS, and they also provide a value by which to compare adolescent-caregiver agreement when investigating the properties of LS measures with adolescents with ASD.

LS in Individuals with ASD

Extensive research has investigated LS in youth without disabilities; however, limited research has examined LS for those with ASD. In a meta-analysis of research evaluating self and informant-reported quality of life (i.e., subjective evaluations of quality of life circumstances, as well as objective measures such as access to health services), individuals with ASD consistently demonstrated lower levels of quality of life across the lifespan than do TD individuals (van Heijst and Geurts 2015). To evaluate self-reported LS, Schmidt et al. (2015) administered the German Quality of Life questionnaire to a group of TD adults and a group of adults with ASD. This measure asks an individual to rate their satisfaction with 10 life domains, such as self, leisure time, relationships with children, and

housing; levels of LS were compared between the groups. Consistent with van Heijst and Geurts' (2015) findings, participants with ASD reported significantly lower levels of overall LS than the TD group, as well as lower satisfaction with health, self, sexuality, and friends and relatives (Schmidt et al. 2015).

While research with adults with ASD informs understanding regarding the levels of LS within this population, research that evaluates this construct with adolescents is also needed. One previous study conducted with youth with a variety of disabilities suggests that youth with chronic conditions, including ASD, report moderate to high levels of LS (McDougall et al. 2012). Four hundred children and adolescents, including 35 with ASD, and their parents completed the Students' Life Satisfaction Scale, which assesses global LS, and the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS), which assesses domain-specific LS. Self-reported LS was high, with a mean score of 31.57 ($SD = 6.26$) of a possible 42 points on the SLSS and a mean of 29.94 ($SD = 3.59$) of a possible 35 points on the BMSLSS. Youth with disabilities reported significantly higher LS than their parents estimated. Despite this difference, parent and child reports were strongly correlated ($r = 0.64$; McDougall et al. 2012), providing preliminary support for the concurrent validity of self-reported LS for youth with disabilities, as the correlation is consistent with that for caregiver-adolescent agreement within TD populations (Dew and Huebner 1994; Gilman and Huebner 1997). Furthermore, results suggested that parents may underestimate the LS of youth with disabilities.

In another study, 96 youth with ASD reported significantly lower well-being compared to TD youth on the KIDSCREEN-27 within the domains of physical well-being ($\eta^2 = 0.25$), psychological well-being ($\eta^2 = 0.13$), autonomy and parent relations ($\eta^2 = 0.15$), social support and peers ($\eta^2 = 0.24$), and school environment ($\eta^2 = 0.10$; Egilson et al. 2017). This finding is consistent with the results of Schmidt et al. (2015) comparison of LS between TD adults and those with ASD. Despite reporting lower well-being than their peers, adolescents with ASD reported higher levels than their parents estimated, particularly regarding physical well-being, psychological well-being, social support and peers, and school environment (Egilson et al. 2017). This pattern of results is consistent with that found by McDougall et al. (2012).

Assets in Adolescents

Assets are defined as internal (e.g., gratitude, optimism, zest) or external (e.g., parent, friend, school support) strengths (Furlong et al. 2014). Internal assets align with the positive personality domain of the emerging disability paradigm;

external assets align with the social contexts domain. Previous research suggests that adolescents' combined assets relate to LS (Furlong et al. 2014). Furlong et al. (2014) developed the Social-Emotional Health Survey (SEHS) as a measure of twelve assets in adolescents. In a sample of high schoolers, a strong, positive relation was reported between SEHS and LS scores (Furlong et al. 2014). You et al. (2014) found that scores on the SEHS were strong, negative predictors of internalizing and school problems. Latent mean analyses led Furlong et al. (2014) and You et al. (2014) to hypothesize that the relation between assets and LS may strengthen as TD adolescents age. This developmental change may occur as adolescents' cognitions and social relationships become more complex. Given the differing cognitive and social development of youth with ASD, the relations between assets, age, and LS should be investigated to determine whether age moderates the relation between assets and LS within this population. Although these studies support the concurrent and discriminant validity of the SEHS, research has not yet examined caregiver-adolescent reports on the SEHS.

Assets and LS in Individuals with ASD

Although research has not comprehensively assessed assets in individuals with ASD, some research has examined assets within this population. Dijkhuis et al. (2017) found that self-regulation and executive functioning skills related to subjective quality of life in a sample of young adults with ASD, suggesting that the executive functioning skills to effectively plan, organize, and manage attention relate to LS within this population. Additional research suggests that social support is related to LS within this population, despite the difficulties with social interaction that characterize ASD. In a study of subjective quality of life in adults with ASD, Hong et al. (2016) found that extraversion was a significant predictor of psychological health and satisfaction with relationships. In the same way, another study with adults with ASD demonstrated that social support is a significant predictor of subjective quality of life (Bishop-Fitzpatrick et al. 2018). Pham and Murray (2016) evaluated a similar question with adolescents with ASD. Specifically, they assessed LS and social support for 228 high school students with disabilities, 8.00% of whom had ASD. There was a positive relation between perceived social support and LS; teacher-child support was a significant predictor of LS even after controlling for parent-child support. Similarly, McDougall and Wright (2017) assessed predictors of LS over 1 year for youth with chronic conditions ($N=498$, 193 females, ASD $n=38$). Self-reported family and teacher support predicted later satisfaction with self, close friend support predicted friend satisfaction, family support predicted school and neighborhood satisfaction, school belongingness/safety predicted

neighborhood satisfaction, and classmate support predicted LS. Varied forms of social support may thus be important contributors to LS for adolescents with disabilities.

Feldhaus et al. (2015) examined the association between self-efficacy and LS for adolescent and young adult males with ASD and their TD peers. Cronbach's alpha for the LS measure developed for the study was 0.90 for the ASD group, indicating that individuals with ASD provided internally consistent reports of LS. The results indicated that self-efficacy was positively related to LS in both groups. However, the relation between self-efficacy and LS was stronger for males with ASD than for TD males. These findings suggest that assets predict LS in adolescents with ASD, as they do for TD adolescents (Feldhaus et al. 2015; Furlong et al. 2014). Given the evidence that assets may uniquely relate to LS in adolescents with ASD (e.g., Feldhaus et al. 2015), a greater variety of assets should be examined to determine the strongest correlates of LS within adolescents with ASD.

The Current Study

Our purposes included investigating the psychometric properties of measures of LS and assets in adolescents with ASD, describing levels of LS within this population and comparing them to a TD sample, and observing the predictive relations between assets and LS. Eight hypotheses were proposed. The first two hypotheses were related to the psychometric properties of LS and asset measures with adolescents with ASD. The second two hypotheses addressed levels of LS in ASD, as well as comparing these levels to those of a TD sample. The final four hypotheses addressed the correlates of LS within adolescents with ASD:

1. Given previous research demonstrating that youth with ASD have provided internally reliable reports of their thoughts and feelings (Feldhaus et al. 2015), we hypothesized that Cronbach's alphas for measures of self-reported LS and assets would meet or exceed 0.80. This value indicates substantial internal consistency for research purposes (Shrout 1998).
2. Based on McDougall et al. (2012) findings of a positive, moderate correlation between self-reported and caregiver-estimated LS in youth with ASD, we hypothesized a positive, moderate correlation between self and caregiver reports of adolescents' LS and assets.
3. Consistent with McDougall et al. (2012) findings of moderate to high levels of LS in youth with ASD, we hypothesized that adolescents with ASD would report moderate to high levels of LS.
4. We hypothesized that adolescents with ASD would report lower levels of LS than TD peers, as found in

- Egilson et al. (2017) comparison of self-reported well-being.
5. Given Feldhaus et al. (2015) finding of a strong, positive relation between self-efficacy and LS in adolescents with ASD and the well-supported positive relation between assets and LS in TD youth (Furlong et al. 2014), we hypothesized a moderate, positive correlation between self-reported assets and LS.
 6. Based on previous findings of significant relation between caregiver and self-reported LS in youth with ASD (McDougall et al. 2012), as well as the expected positive correlation between self-reported assets and LS, we expected a moderate, positive correlation between caregiver estimates of adolescents' assets and adolescents' self-reported LS.
 7. Furlong et al. (2014) asserted that the relation between assets and LS may become stronger as adolescents age due to changes in cognitive styles. We thus hypothesized that age would moderate the relation between self-reported assets and LS.
 8. Similar to Hypothesis 7, we hypothesized that adolescent age would moderate the relation between caregivers' estimates of assets and adolescents' self-reported LS.

Method

Participants and Procedures

Two recruitment methods were employed. For the first method, caregiver-adolescent dyads ($n = 17$) were recruited from a summer camp for children with ASD. Caregivers signed informed consent forms, and dyads independently completed paper questionnaires. The paper questionnaire included all measures used in the second data collection method, except the Social Communication Questionnaire (SCQ) and caregiver demographic information.

For the second recruitment method, dyads ($n = 47$) completed an electronic questionnaire. An invitation to participate was submitted to ASD organizations and social media pages, and informational flyers were posted at community locations (e.g., doctors' offices, libraries, churches) in the Southeastern United States. When participants accessed the electronic questionnaire, the first page provided a study description and invitation to participate. The survey then prompted the caregiver to complete demographic and caregiver questionnaires. Following the caregiver questionnaire, the website prompted the caregiver to ask the adolescent to independently complete the adolescent portion, beginning on the next screen. Participants had the opportunity to provide their email address to enter a drawing for two of eight \$25.00 Amazon.com gift cards (i.e.,

both members of winning dyads received a \$25.00 gift card). Email addresses were not associated with responses.

Participants were required to be between 13 and 18 years of age and have a diagnosis of ASD. To ensure that adolescents had the cognitive ability to complete the questionnaire, adolescents who were primarily educated in self-contained settings were excluded. Caregivers completed the SCQ to confirm ASD symptoms on the electronic questionnaire. The SCQ uses a cut-off score of 15 to indicate whether an individual possesses symptoms that are consistent with ASD (Rutter et al. 2003). Two participants received SCQ scores below 15; their data were excluded from analyses. Additionally, 16 adolescents failed to respond to the adolescent questionnaire, despite their caregiver responding to at least part of the caregiver survey. Due to these adolescents not responding to any questions, these dyads were considered non-participants and excluded from analyses.

The final sample consisted of 46 caregiver-adolescent dyads across both recruitment methods. Of the final sample, 87.20% of caregivers were biological parents of the adolescent, 10.30% were adoptive parents, and 3.40% were legal guardians. To estimate socioeconomic status, caregivers indicated whether adolescents received free or reduced-cost lunch at school; 56.50% of respondents indicated that they did not receive free or reduced-cost lunch. In comparison, 52.00% of school-aged children in the United States received free or reduced-cost lunch during the most recent national assessment (National Center for Education Statistics 2015, Table 204.01). The mean SCQ score of the final adolescent sample was 23.09 ($SD = 6.23$), and the mean age of ASD diagnosis was 7.52 years ($SD = 4.51$). Caregivers reported that 51.30% of the sample was diagnosed with ASD by a pediatrician or other medical doctor, 43.60% was diagnosed by a psychologist, and 5.10% was diagnosed by another professional.

An extant data set served as the TD comparison sample. These data were collected for an epidemiological study of emotional and behavioral symptoms in children in the Southeastern United States. Participants were recruited through a school district. Teachers rated emotional and behavioral symptoms for 76.70% of the 10,500 students who were enrolled in the district, and 241 students were selected using stratified randomization procedures to complete the BMSLSS and additional measures. For the present comparison sample, students between 13 and 18 years of age who did not receive special education services were included ($n = 67$). Demographic information is provided for the dyads and TD comparison sample in Table 1.

Table 1 Demographic information for dyads (N=46) and the TD comparison sample (n=67)

	Caregivers	Adolescents with ASD	TD adolescents
Mean age (<i>SD</i>)	45.62 (5.47)	14.98 (1.64)	14.96 (1.71)
Gender			
Male	0.00%	78.30%	46.27%
Female	100.00%	21.70%	53.73%
Race			
Asian	2.20%	4.30%	0.00%
African-American/Black	4.30%	13.00%	35.82%
American Indian/Alaskan	2.20%	0.00%	1.49%
Caucasian/White	50.00%	71.70%	44.78%
Hispanic/Latino	0.00%	2.20%	1.49%
Bi-racial	2.20%	4.30%	14.93%
Other/not reported	30.80%	2.20%	1.49%

Measures

Demographic Information

Caregivers provided demographic information regarding their relation to the adolescent for both recruitment methods. In the electronic questionnaire, caregivers also provided their own age, gender, and race. Adolescent information (e.g., age, gender, race/ethnicity, free/reduced lunch status, primary education setting, and age first diagnosed with ASD) was reported for both recruitment methods.

SCQ—Lifetime Form (Rutter et al. 2003)

On the electronic questionnaire, caregivers completed the SCQ to assess adolescents' ASD symptomatology. The SCQ is a 40-item screening tool that assesses symptoms of ASD in individuals who are 4 years and older. The SCQ is based on the questions of the Autism Diagnostic Interview—Revised (ADI-R), which is a standardized caregiver interview that is commonly used within a comprehensive evaluation for autism spectrum disorder. If an SCQ score exceeds 15, it suggests that ASD is an area of concern for this individual (Rutter et al. 2003). According to the standardization sample, Cronbach's alpha for the total scale was 0.90, and it loaded onto four factors: social interaction, communication, abnormal language, and stereotyped behavior (Rutter et al. 2003). Its scores are strongly correlated with those of the ADI-R, and it discriminates between ASD and intellectual disabilities in youth (Berument et al. 1999). In this study, Cronbach's alpha was 0.81.

BMSLSS (Seligson et al. 2003)

The BMSLSS is a 6-item scale that assesses middle and high school students' satisfaction with various domains of life, including family, friends, school, neighborhood,

and self. Responses are indicated on a 7-point scale, ranging from "Terrible" to "Delighted;" higher scores indicate greater LS (Seligson et al. 2003). Prior research has demonstrated a Cronbach's alpha of 0.75, and it suggests a strong relationship between the BMSLSS and the Multidimensional Students' Life Satisfaction Scale (Seligson et al. 2003). Adolescents reported their own LS, while caregivers reported their estimates of adolescents' LS in the current study.

Social-Emotional Health Survey for Secondary School Students (SEHS; Furlong et al. 2014)

The SEHS is a 36-item measure that assesses assets in adolescents between 13 and 18 years of age. According to Furlong et al. (2014), it may be useful as a screening tool, as well as to monitor progress within treatment to enhance assets. The scale contains four domains, which are each comprised of three subscales. The belief-in-self domain consists of the self-efficacy, self-awareness, and persistence subscales. The belief-in-others domain is comprised of school support, peer support, and family coherence. The emotional competence domain is comprised of emotion regulation, empathy, and self-control. The engaged living domain is comprised of gratitude, zest, and optimism. Responses fall on a 4-point Likert scale ranging from "not at all true of me" to "very much true of me." Greater scores indicate greater levels of assets. Factor analysis indicated that the twelve subscales load onto the four domains, which load onto a second-order factor, termed covitality (Furlong et al. 2014). In previous research with racially diverse groups of adolescents, Cronbach's alphas for the total SEHS ranged from 0.95 to 0.96 (You et al. 2015). In our study, adolescents reported their own assets, and caregivers reported their perceptions of adolescents' assets. The SEHS was not included within the extant data set for the TD comparison group.

Results

Linear regressions were conducted to determine whether recruitment method significantly predicted the primary variables (e.g., caregiver and adolescent reports of LS and assets). Recruitment method did not predict self-reported assets [$F(1, 44) = 0.20, p > .05$] or LS [$F(1, 43) = 0.86, p > .05$], nor did it predict caregivers' estimates of adolescents' LS [$F(1, 39) = 0.01, p > .05$] or assets [$F(1, 40) = 3.00, p > .05$]. Data were thus combined for all analyses. Demographic variables (i.e., caregiver relation, caregiver race, adolescent gender, adolescent race, and socioeconomic status) did not predict adolescent-reported LS [$F(5, 22) = 1.19, p > .05$] or assets [$F(5, 22) = 1.19, p > .05$]. Additionally, demographic variables did not predict caregiver-reported LS [$F(5, 21) = 1.69, p > .05$] or assets [$F(5, 22) = 1.13, p > .05$]. Demographic data were thus not controlled for in subsequent analyses.

Before analyses were conducted, scatter plots of the primary study variables were visually examined. For both caregiver-estimated and adolescent-reported assets and LS, the curves were negatively skewed. Missingness was also assessed. For adolescent reports on the BMSLSS and SEHS, the percent of missing data ranged from 0.00 to 2.20% per item (median = 0.00%). For caregiver reports on the BMSLSS and SEHS, the percent of missing data ranged from 8.70 to 10.90% per item (median = 8.70%). No data were missing on the BMSLSS for the TD comparison sample.

Hypothesis 1

Cronbach's alphas were calculated for the self-reported BMSLSS, SEHS, and subscales of the SEHS. The results are presented in Table 2. Cronbach's alpha reached or exceeded the value of 0.80 for the BMSLSS and SEHS, as well as the school support, peer support, empathy, optimism, and gratitude subscales. Cronbach's alpha values ranged from 0.62 to 0.78 for self-efficacy, self-awareness, persistence, family coherence, emotion regulation, self-control, and zest.

Hypothesis 2

Pearson product moment correlations were calculated for caregiver-estimated and adolescent-reported LS, as well as for the SEHS subscales. These correlations are presented in Table 3. Caregiver and adolescent agreement differed between subscales. There was a moderate correlation between caregiver-estimated and adolescent-reported LS. Regarding assets, agreement was poor for self-efficacy, self-awareness, emotion regulation, self-control, gratitude, and zest. Small to moderate correlations were found for persistence, school support, family coherence, peer support, empathy, and optimism.

Hypotheses 3 and 4

Table 4 presents the means and medians for adolescent-reported LS; a stacked bar chart demonstrating the distribution of responses is presented in Fig. 1. Adolescents

Table 2 Cronbach's alpha values for the BMSLSS and SEHS

Measure	Cronbach's alpha
BMSLSS	0.87
SEHS	0.94
Self-efficacy	0.64
Self-awareness	0.62
Persistence	0.67
School support	0.86
Family coherence	0.76
Peer support	0.82
Emotion regulation	0.78
Empathy	0.84
Self-control	0.64
Optimism	0.84
Gratitude	0.91
Zest	0.70

Table 3 Correlations between caregiver and adolescent-reported LS and assets (n = 41 dyads)

Measure	Correlation
BMSLSS	0.64*
Self-efficacy	0.10
Self-awareness	0.16
Persistence	0.35*
School support	0.60*
Family coherence	0.39*
Peer support	0.39*
Emotion regulation	0.09
Empathy	0.34*
Self-control	0.10
Optimism	0.57*
Gratitude	0.17
Zest	0.01

* $p < .05$

with ASD endorsed LS levels ranging from “mixed” to “pleased” across life domains. Self-reported LS scores were compared to those of the TD sample using independent samples t-tests; the criterion for significance was adjusted to 0.01 to control for multiple comparisons. Cronbach’s alpha for the TD comparison sample’s BMSLSS was 0.85. Significant group differences emerged for family,

friend, self, LS, and total LS. The TD sample reported higher LS than the ASD sample in each of these domains; Cohen’s *d* values demonstrated moderate effect sizes for each difference (Cohen 1988). There were no significant differences in school or neighborhood satisfaction. See Table 5 for the mean and median LS scores, as well as Cohen’s *d* values.

Table 4 Levels of LS for adolescents with ASD (n=46)

Domain	Mean (SD)	Median	Mean response descriptor
Family satisfaction	5.04 (1.44)	5.00	Mostly satisfied—pleased
Friend satisfaction	4.98 (1.61)	5.00	Mixed—mostly satisfied
School satisfaction	4.56 (1.75)	5.00	Mixed—mostly satisfied
Self satisfaction	5.07 (1.51)	5.00	Mostly satisfied—pleased
Neighborhood satisfaction	5.41 (1.39)	6.00	Mostly satisfied—pleased
Life satisfaction	4.91 (1.38)	5.00	Mixed—mostly satisfied

Fig. 1 Stacked bar chart demonstrating the distribution of adolescent responses for each item of the BMSLSS

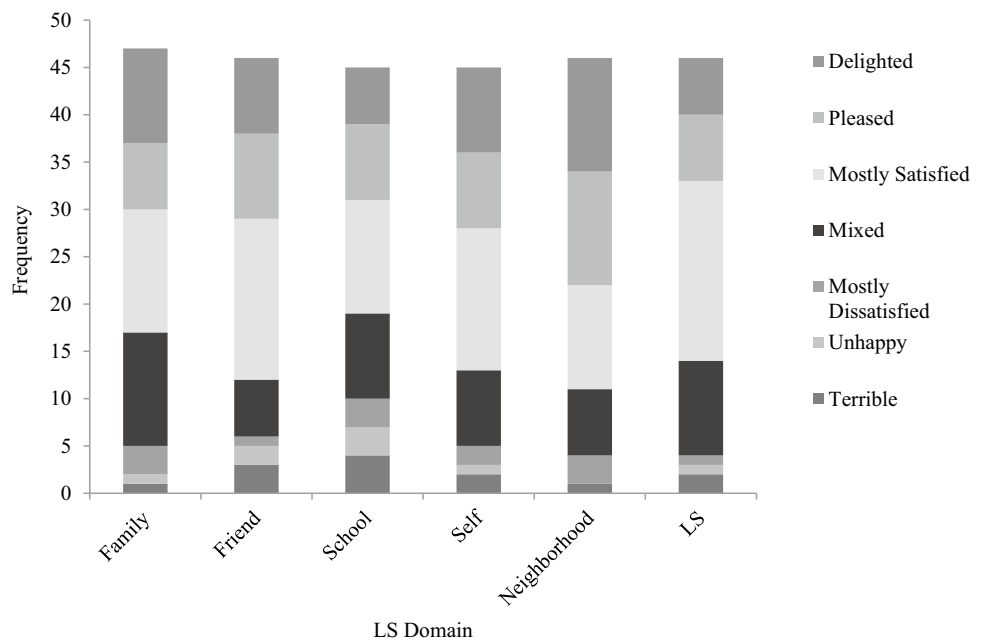


Table 5 Means and standard deviations for BMSLSS scores for TD adolescents (n=67) and those with ASD (n=46)

Domain	ASD Mean (SD)	TD Mean (SD)	<i>t</i> (degrees of freedom)	Cohen’s <i>d</i>
Family satisfaction	5.04 (1.44)	5.82 (1.18)	3.16* (112)	0.59
Friend satisfaction	4.98 (1.61)	5.84 (1.24)	3.12* (111)	0.60
School satisfaction	4.56 (1.75)	5.16 (1.37)	2.06 (110)	–
Self satisfaction	5.07 (1.51)	5.97 (1.44)	3.12* (110)	0.61
Neighborhood satisfaction	5.41 (1.39)	5.84 (1.33)	1.62 (111)	–
Life satisfaction	4.91 (1.38)	5.93 (1.30)	3.98* (111)	0.76
Total BMSLSS	29.23 (7.82)	34.55 (5.95)	4.12* (112)	0.77

**p* < .01

Table 6 Correlations between adolescent-reported LS and assets (n = 42)

Assets	Correlation with LS
Self-efficacy	0.48*
Self-awareness	0.37*
Persistence	0.31*
School support	0.36*
Family coherence	0.46*
Peer support	0.40*
Emotion regulation	0.35*
Empathy	0.31*
Self-control	0.28
Optimism	0.63*
Gratitude	0.38*
Zest	0.20

* $p < .05$ **Table 7** Correlations between caregiver-reported assets and adolescent-reported LS (n = 41 dyads)

Assets	Correlation with LS
Self-efficacy	0.02
Self-awareness	0.18
Persistence	-0.25
School support	0.28
Family coherence	0.14
Peer support	0.13
Emotion regulation	0.20
Empathy	0.05
Self-control	0.03
Optimism	0.59*
Gratitude	0.28
Zest	0.38*

* $p < .05$

Hypothesis 5

Pearson correlations were calculated for the relation between each of the adolescent-reported SEHS subscales and adolescent-reported LS (see Table 6). There were significant correlations between LS and self-efficacy, self-awareness, persistence, school support, family coherence, peer support, emotion regulation, empathy, optimism, and gratitude. The strongest correlation was between optimism and LS. Conversely, self-control and zest were unrelated to LS.

Hypothesis 6

Similarly, the Pearson correlations between each of the caregiver-reported SEHS subscales and adolescent-reported LS were calculated (see Table 7). Contrary to the hypothesis, the majority of caregiver-estimated assets were unrelated to adolescent-reported LS. However, there was a moderate correlation between caregiver-reported optimism and adolescent-reported LS, as well as a small correlation between caregiver-reported zest and adolescent-reported LS.

Hypothesis 7

A hierarchical multiple regression was conducted to assess the relations between adolescent-reported assets, age, and adolescent-reported LS, as well as the interaction between assets and age. In the first step, self-reported LS was regressed on all assets subscales. Together, assets accounted for a significant portion of variance in LS [$R^2 = 0.67$, $F(12, 30) = 4.95$, $p < .01$]. Self-awareness, school support, and optimism were significant predictors of LS. In the second step, age did not account for significant variance beyond assets [$\Delta R^2 = 0.00$, $F(13, 29) = 4.42$, $p < .01$]. In the final step, the interaction terms for each assets by age was added to the model. The interaction between age and assets accounted for a significant portion of variance in LS, above and beyond the contribution of assets [$\Delta R^2 = 0.25$, $F(25, 17) = 10.37$, $p < .01$]. There was a significant interaction between age and self-awareness, persistence, family coherence and empathy, such that the relationship between these assets and LS depended on adolescents' ages. See Table 8 for a summary of the model. Figures 2, 3, 4 and 5 present scatterplots of the relations between these assets and LS for adolescents based on age quartiles.

Hypothesis 8

To assess the relations between caregiver-reported assets, adolescent age, and adolescent-reported LS, a moderation analysis was conducted. In the first step of a hierarchical multiple regression, LS was regressed on all caregiver-reported assets subscales. Within this model, assets accounted for significant variance in LS [$R^2 = 0.56$, $F(12, 27) = 2.91$, $p < .01$]. Caregiver-reported Optimism predicted adolescent-reported LS. Second, age was added to the model [$\Delta R^2 = 0.02$, $F(13, 26) = 2.78$, $p < .01$]. Third, interaction terms of caregiver-reported assets by age were added [$\Delta R^2 = 0.16$, $F(25, 14) = 1.59$, $p > .01$]. No interactions

Table 8 Hierarchical multiple regression for relations between adolescent-reported assets, age, and LS (n=42)

Step	ΔR^2	B	SE B	t
Step 1	0.67			
Intercept		6.65	5.92	1.12
Self-efficacy		-0.34	0.60	-0.56
Self-awareness		-1.30	0.60	-2.16*
Persistence		-0.63	0.48	-1.31
School support		1.67	0.58	2.87*
Family coherence		0.11	0.68	0.16
Peer support		0.64	0.34	1.90
Emotion regulation		0.96	0.52	1.87
Empathy		-0.35	0.39	-0.90
Self-control		0.40	0.50	0.79
Optimism		1.84	0.58	3.17*
Gratitude		-0.46	0.38	-1.21
Zest		0.03	0.28	0.10
Step 2	0.00			
Age		0.00	0.57	0.00
Step 3	0.24			
Self-efficacy \times age		0.45	0.50	0.90
Self-awareness \times age		-1.28	0.54	-2.35*
Persistence \times age		1.04	0.39	2.63*
School support \times age		-0.55	0.42	-1.32
Family coherence \times age		-1.61	0.51	-3.17*
Peer support \times age		0.15	0.19	0.80
Emotion regulation \times age		-0.53	0.44	-1.21
Empathy \times age		0.62	0.28	2.19*
Self-control \times age		0.50	0.29	1.69
Optimism \times age		0.11	0.48	0.24
Gratitude \times age		0.51	0.33	1.58
Zest \times age		0.04	0.12	0.34

For Step 1, $R^2=0.67$, $F(12, 30)=4.95$, $p<.01$. For Step 2, $R^2=0.67$, $F(13, 29)=4.42$, $p<.01$. For Step 3, $R^2=0.91$, $F(25, 17)=10.37$, $p<.01$

* $p<.01$

emerged as significant predictors of LS. See Table 9 for the model summary.

Discussion

Preliminary support was provided for the reliability and validity of the BMSLSS and SEHS in adolescents with ASD. Cronbach's alpha surpassed 0.80 for the BMSLSS and several SEHS subscales (e.g., school support, peer support, empathy, optimism, gratitude). The self-efficacy, self-awareness, self-control, zest, and family coherence, and emotion regulation subscales, however, yielded alpha values ranging from 0.62 to 0.78. Because scales with many items tend to provide greater internal consistency estimates, Cronbach's

alpha may have been negatively affected by the three-item subscales on the SEHS (Ponterotto and Ruckdeschel 2007). Shrout (1998) asserted that alphas between 0.60 and 0.80 indicate fair to moderate reliability, and thus may be acceptable for research purposes. However, higher values (e.g., 0.90) are needed for clinical decision-making (Ponterotto and Ruckdeschel 2007).

Regarding validity, there was a moderate correlation between caregiver-estimated and adolescent-reported LS, as well as for caregiver-estimated and adolescent-reported persistence, school support, family coherence, peer support, empathy, and optimism. There were non-significant correlations between caregiver and adolescent-reported self-efficacy, self-awareness, emotion regulation, self-control, gratitude, and zest subscales. Dyads showed consistent agreement on measures of belief-in-others (e.g., school support, family coherence, peer support). Agreement on these scales may be due to the observable nature of these items, while the belief-in-self, emotional competence, and engaged living domains reflect covert perceptions. Some of these correlations are consistent with moderate caregiver-adolescent correlations on measures of LS within TD adolescents (Dew and Huebner 1994; Gilman and Huebner 1997).

Consistent with the findings of McDougall et al. (2012), adolescents with ASD endorsed moderate to high levels of LS. However, adolescents with ASD endorsed lower levels of family, friend, self, and overall LS compared to the TD sample. It should be noted that the third and fourth hypotheses could be somewhat contradictory. Specifically, if adolescents with ASD endorsed moderate to high levels of LS, a restriction of range could limit the ability to detect a significant difference between the two samples. These hypotheses were informed by the previous literature, which identified a significant difference in subjective quality of life between ASD and TD samples (e.g., Schmidt et al. 2015). Despite this difference, previous research also suggests that adolescents with chronic conditions, including ASD, may nevertheless report moderate to high levels of LS (McDougall et al. 2012). Thus, although a difference was expected between the TD and ASD sample, the magnitude of this difference would be hypothesized to be small, possibly attenuated somewhat, based on the hypothesized levels of LS within the ASD group. To our knowledge, this is the first study to directly compare levels of LS between TD adolescents and those with ASD. Our findings suggested inequities in levels of general and domain-specific LS between TD youth and those with ASD. Future research should assess this inequity and identify strategies to increase LS in adolescents with ASD.

Results were variable for the relations between assets and LS in adolescents with ASD. There were moderate correlations between adolescent-reported LS and self-efficacy, self-awareness, persistence, school support,

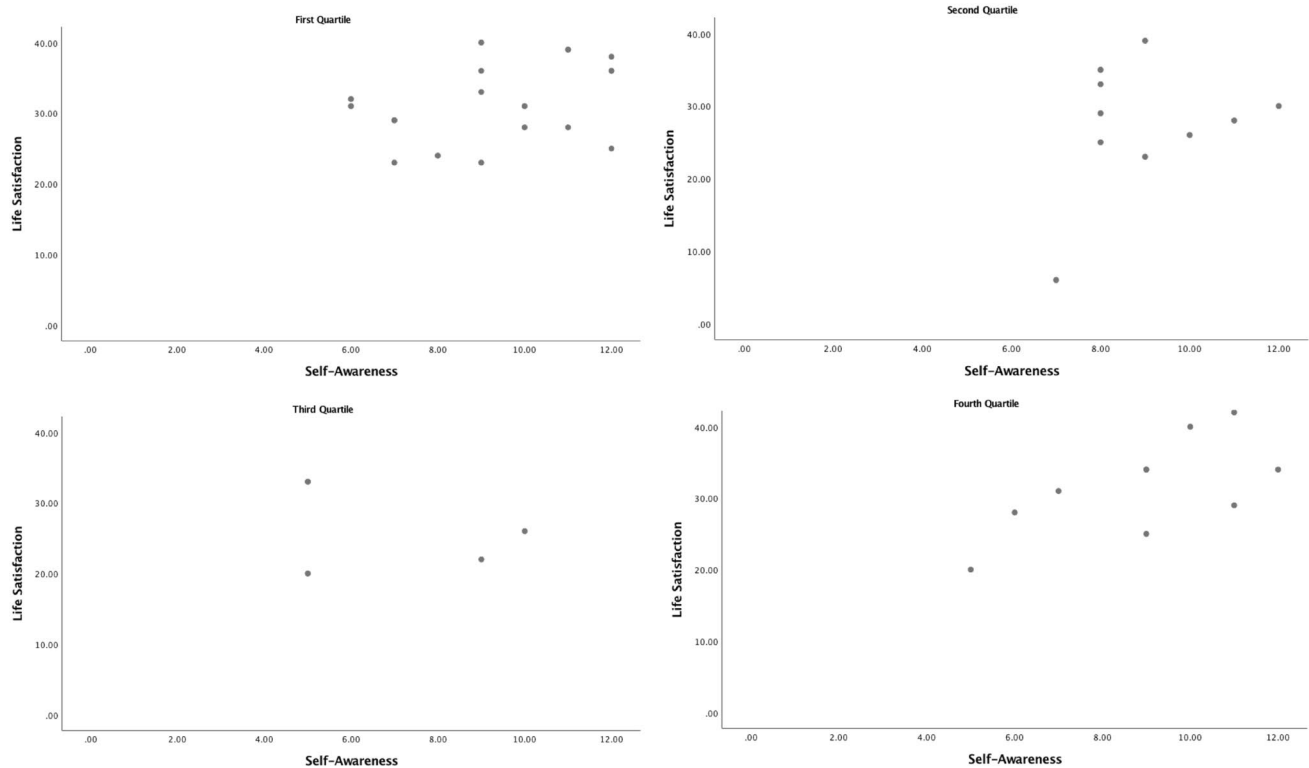


Fig. 2 Scatter plot matrix for the relations between self-awareness and LS for adolescents. Figures are divided by age quartile (25.00 percentile = 14.00, 50.00 percentile = 15.00, 75.00 percentile = 17.00)

family coherence, peer support, emotion regulation, empathy, optimism, and gratitude. The strongest correlations emerged between LS and optimism, school support, family coherence, and self-efficacy. The relation between self-efficacy and LS is consistent with previous research that detected a strong relationship between self-efficacy and LS for individuals with ASD (Feldhaus et al. 2015). Further, Pham and Murray (2016) noted that parent and teacher support were strongly associated with LS for adolescents with disabilities. Because adolescents with ASD may experience difficulty establishing friendships with peers, support from family and school may be particularly important for their LS.

Conversely, only caregiver-estimated zest and optimism related to adolescent-reported LS. The items that assess zest and optimism measure adolescents' energy and activity levels (Furlong et al. 2014). Because adolescents with ASD may be unlikely to communicate their internal states to caregivers, caregivers may observe their activity levels as indicators of LS. With regard to the non-significant correlations, these results suggest that caregivers' perceptions of assets are unrelated to adolescents' self-reported LS. In order to contextualize these findings, future research should assess the relations between caregiver-reported assets and adolescent-reported LS within TD samples.

To further assess the relation between assets and LS, two moderation analyses were conducted. There was a main effect of caregiver-estimated and adolescent-reported assets on LS. There was not a main effect of age on LS in either model. Age interacted with self-reported self-awareness, persistence, family coherence, and empathy to predict LS, suggesting stronger positive relations between assets and LS for younger adolescents than for older adolescents. Younger adolescents who perceive themselves as possessing higher levels of self-awareness, persistence, empathy, and family coherence may experience an advantage compared to their peers with ASD who perceive lower levels of these skills. Adolescents who perceive themselves as having greater levels of these assets may concurrently experience higher LS. As adolescents develop greater social-cognitive skills, this differential relation may attenuate. Such an interaction may not emerge for caregiver reports, as caregivers base their ratings from their observations of adolescents' behavior, rather than adolescents' internal thoughts and feelings.

Our study displayed several limitations. The study included a small sample of dyads, and Caucasian/White families may have been overrepresented. Participants also had access to resources to attend a summer camp or complete an electronic questionnaire. Thus, the results may not generalize to adolescents with fewer resources.

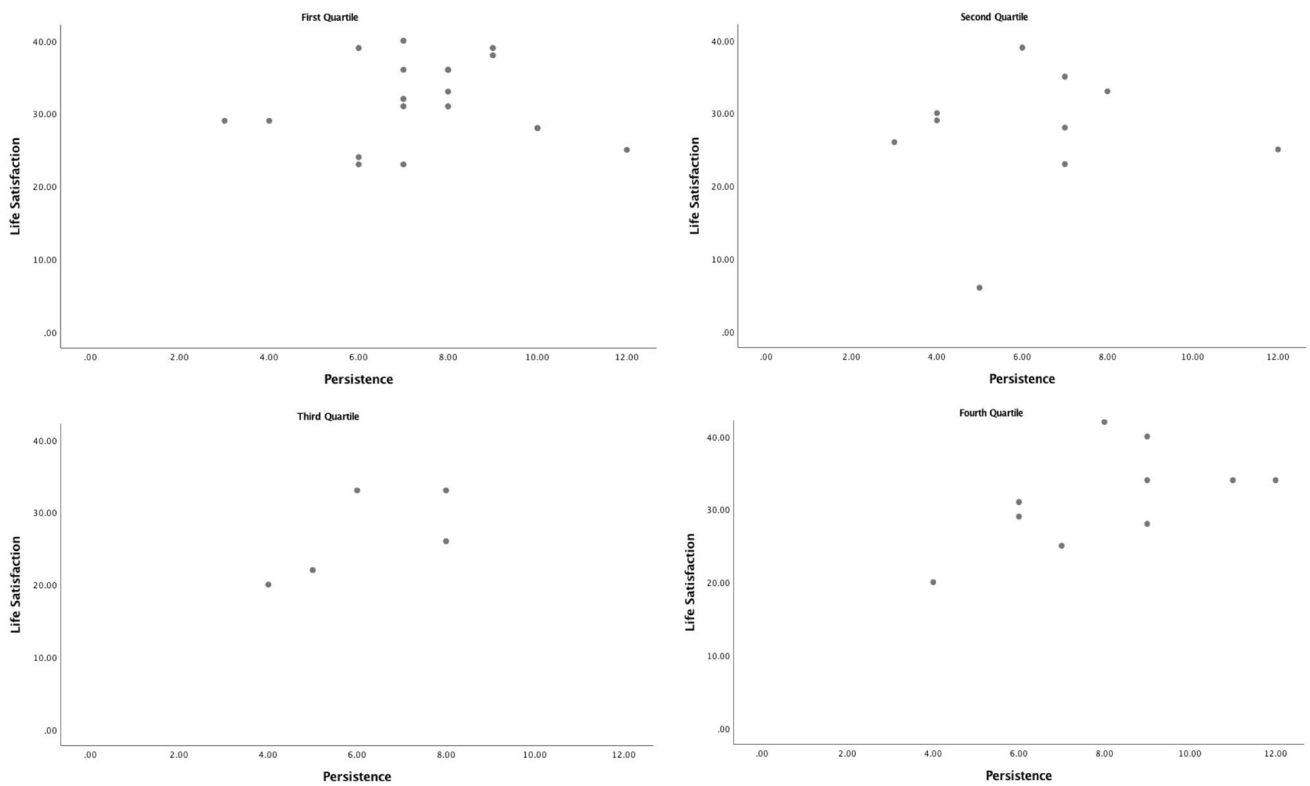


Fig. 3 Scatter plot matrix for the relations between persistence and LS for adolescents. Figures are divided by age quartile (25.00 percentile = 14.00, 50.00 percentile = 15.00, 75.00 percentile = 17.00)

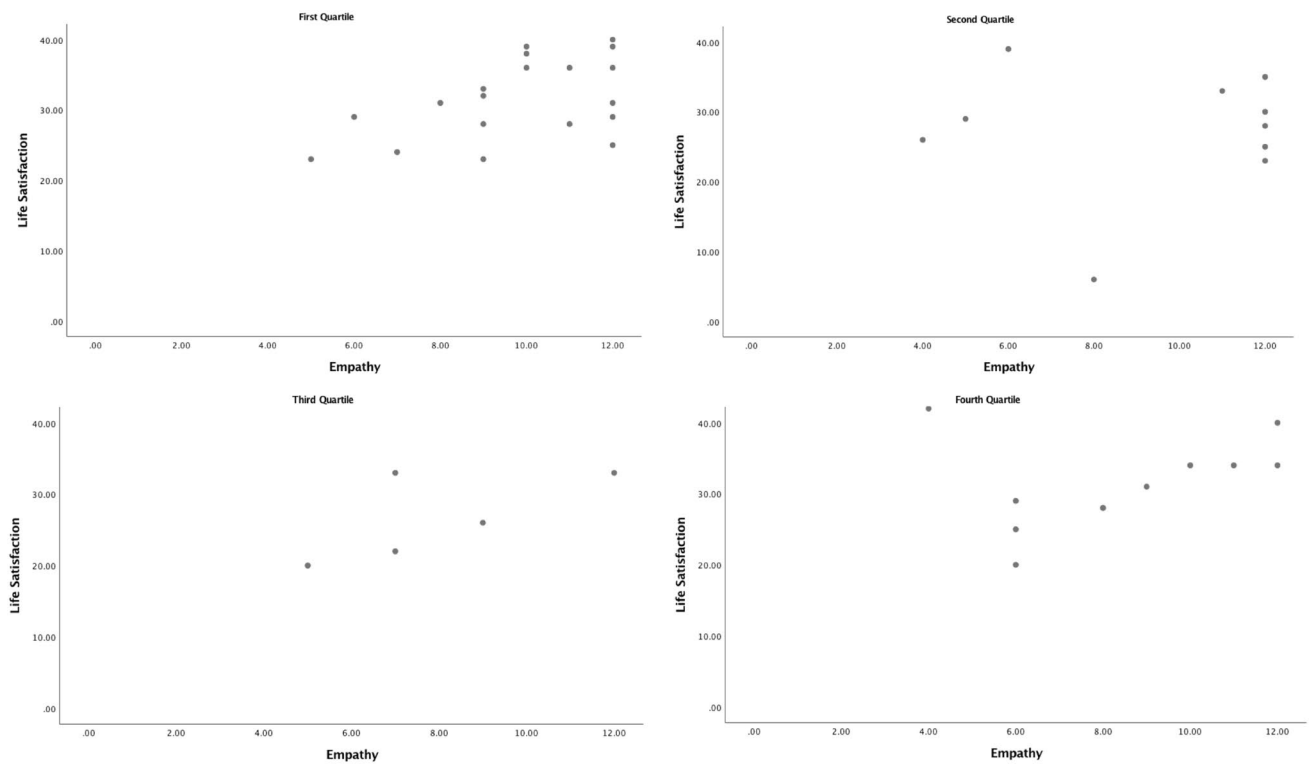


Fig. 4 Scatter plot matrix for the relations between empathy and LS for adolescents. Figures are divided by age quartile (25.00 percentile = 14.00, 50.00 percentile = 15.00, 75.00 percentile = 17.00)

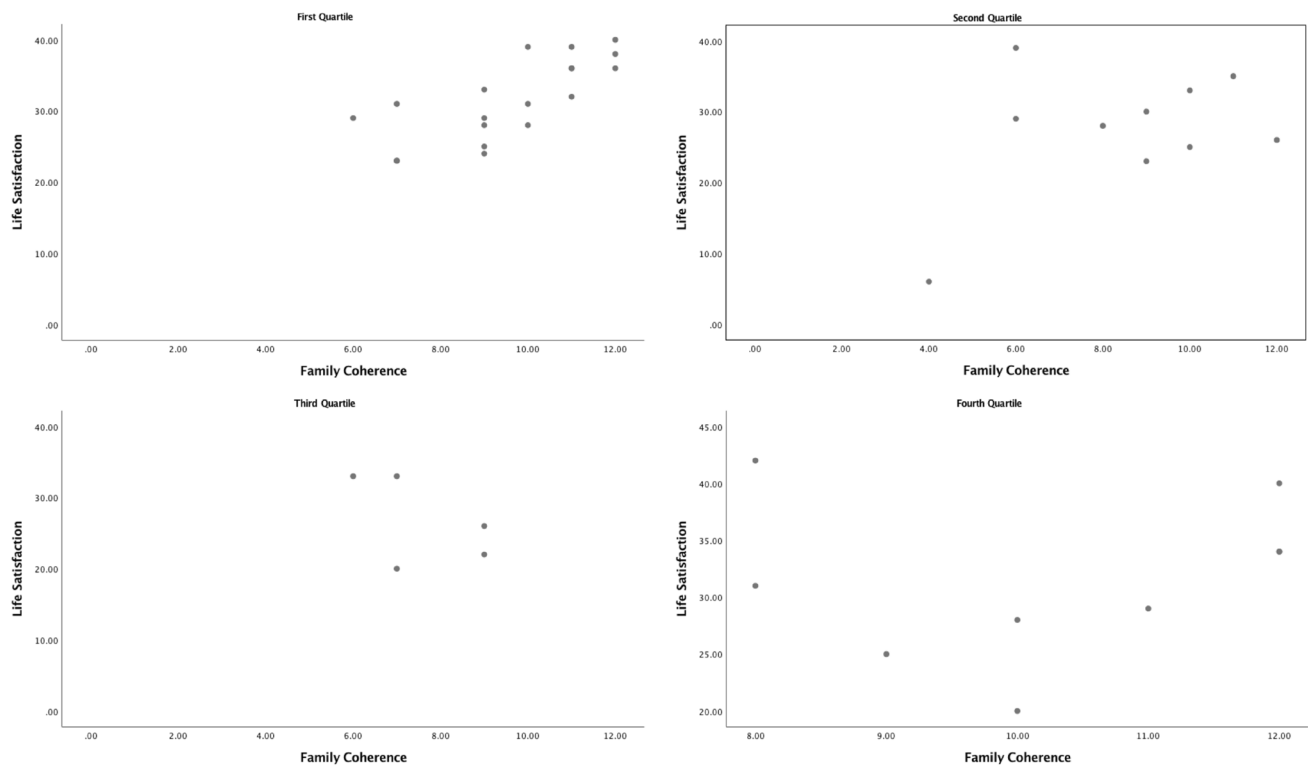


Fig. 5 Scatter plot matrix for the relations between family coherence and LS for adolescents. Figures are divided by age quartile (25.00 percentile = 14.00, 50.00 percentile = 15.00, 75.00 percentile = 17.00)

Finally, there were differences between the ASD and TD groups, including gender and socioeconomic status. As in this study, however, demographic variables have generally revealed small effects on general LS in TD youth, (Dinisman and Ben-Arieh 2016; Huebner et al. 2014). Nevertheless, future researchers could match participants on demographic variables for group comparisons.

Despite these limitations, the study yields implications for research. The results demonstrated preliminary evidence for the psychometric properties of the BMSLSS and SEHS with adolescents with ASD. Future researchers may employ these measures with adolescents with ASD, albeit with caution for the self-efficacy, self-awareness, self-control, zest, and family coherence, and emotion regulation subscales. Future research should further evaluate their psychometric properties; studies of test–retest reliability and predictive validity would be informative. Research may address the nature of the relation between assets and LS across development, as well as further investigate the mechanism of the interaction between assets, age, and LS in adolescents with ASD. Future research should also assess discrepancies between caregiver and adolescent reports of assets. For example, editing measures to behaviorally define assets may increase caregiver and adolescent consistency.

Our results also provide implications for practice with adolescents with ASD. Adolescents' reports of assets and LS may provide incremental validity relative to the traditional symptom-based information in mental health assessments. Self-reports may also inform interventions, including strength-based interventions that are designed to foster assets and LS (e.g., Proctor et al. 2011). Further, the pattern of differences in LS between TD adolescents and those with ASD suggest that interventions targeting social relationships may be beneficial. For example, the Program for the Education and Enrichment of Relation Skills has been shown to decrease social anxiety and increase social skills in adolescents with ASD (Schohl et al. 2014). Future research may measure adolescents' reports of peer support, peer satisfaction, and LS to assess whether this intervention is related to improvements in these domains.

These results provided implications for each domain of the emerging disability paradigm. Within the positive experiences domain, this study provided preliminary support for the internal reliability and validity of the BMSLSS with adolescents with ASD. It also demonstrated that adolescents with ASD report moderate to high levels of LS and experience lower levels of LS than their TD peers. Within the positive personality domain, this study supported the internal consistency and concurrent validity of some subscales of

Table 9 Hierarchical multiple regression for relations between caregiver-reported assets, age, and adolescent-reported LS (n = 39 dyads)

Step	ΔR^2	B	SE B	t
Step 1	0.56			
Intercept		18.79	6.54	2.87*
Self-efficacy		-0.63	0.74	-0.85
Self-awareness		0.86	0.98	0.89
Persistence		-1.01	0.46	-2.18
School support		0.97	0.53	1.84
Family coherence		-0.67	0.51	-1.32
Peer support		0.04	0.49	0.09
Emotion regulation		0.31	0.53	0.59
Empathy		0.06	0.42	0.15
Self-control		-0.51	0.67	-0.77
Optimism		1.78	0.57	3.16*
Gratitude		0.34	0.39	0.86
Zest		-0.35	0.51	-0.70
Step 2	0.02			
Age		0.65	0.62	1.04
Step 3	0.16			
Self-efficacy × age		-0.26	0.79	-0.33
Self-awareness × age		-0.58	1.08	-0.53
Persistence × age		0.48	0.50	0.36
School support × age		-0.14	0.68	-0.21
Family coherence × age		-0.23	0.53	-0.43
Peer support × age		-0.07	0.64	-0.11
Emotion regulation × age		0.21	0.65	0.32
Empathy × age		0.31	0.62	0.50
Self-control × age		0.38	0.75	-0.23
Optimism × age		-0.17	0.74	-0.23
Gratitude × age		-0.47	0.49	-0.95
Zest × age		0.63	0.58	1.01

For Step 1, $R^2=0.56$, $F(12, 27)=2.91$, $p<.01$. For Step 2, $R^2=0.58$, $F(13, 26)=2.78$, $p<.01$. For Step 3, $R^2=0.74$, $F(25, 14)=1.59$, $p>.01$

* $p<.01$

the SEHS with youth with ASD. The study also detected relations between some self-reported assets and LS. Within the social contexts domain, this study provided support for the use of measures of family, peer, and school support with adolescents with ASD, and it revealed a significant association between LS and school and family support in youth with ASD.

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Author Contributions KBF conceived of the study, participated in its design and coordination, performed the statistical analyses, participated in interpretation of the data, and drafted the manuscript. KH, ESH, and

KF participated in the study design and interpretation of the data. All authors read and approved the final manuscript.

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Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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