



Hope in Neurodiverse Adolescents: Disparities and Correlates

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Abstract

Objectives Hope is reliably associated with positive outcomes in youth; however, prior literature has yet to explore hope in neurodiverse individuals. As adolescents with neurodevelopmental differences (ND) display distinct neurocognitive profiles and are at risk for poor psychosocial outcomes, it is essential to understand how this marginalized group may vary in their own subjective ratings of hope, and how hope may relate to positive adjustment in this population. Further investigation of relational determinants, such as family characteristics and peer relationships, is also warranted to increase understanding of how various dimensions of social support relate to hope for different populations.

Methods The current study assessed group differences in hope for ND adolescents on the autism spectrum and/or with intellectual disabilities, as compared to neurotypical (NT) adolescents. Additionally, correlates and predictors of hope were clarified across neurodiverse groups. Participants included 185 adolescents (NT: $n = 96$; ND: $n = 89$) and their mothers as part of a larger longitudinal study.

Results Results indicated that adolescents with ND reported significantly lower hope than NT peers, $t(183) = 3.31$, $p = .001$, with autistic adolescents at highest risk. Regardless of neurodevelopmental status, greater hope was associated with fewer internalizing symptoms ($F(1,178) = 12.35$, $p = .001$) and higher quality of life ($F(1,179) = 57.05$, $p < .001$). Furthermore, maternal scaffolding and adolescent social skills were predictive of higher hope across groups.

Conclusions Findings underscore the importance of hope in adolescence for all youth and highlight avenues for intervention.

Keywords Hope · Neurodiversity · Autism · Neurodevelopmental · Intellectual disability · Protective factors · Adolescence

Hope is defined as the belief in one's own ability to derive pathways to future goals and to sustain motivation and action via agency thinking to use those pathways (Snyder, 2002; Snyder et al., 2002). In neurotypical youth, hope has shown protective associations with anxiety, depression, life satisfaction, self-esteem, optimism, perceived competence, and academic achievement (Marques et al., 2007; Snyder et al., 1997; Valle et al., 2004; Wong & Lim, 2009; Yarcheski & Mahon, 2016). Hope has been previously examined in pediatric medical populations and has similarly demonstrated protective effects on anxiety, quality of life, physiological health, and coping (Griggs & Walker, 2016; Martins et al., 2018). Though

this evidence shows that hope reliably relates to a variety of life outcomes in many youths, it is unclear whether these protective effects extend to other marginalized populations.

The focus of the current study is on hope in adolescents with neurodevelopmental differences, specifically adolescents on the autism spectrum and/or with intellectual disabilities. Of note, though we acknowledge individual differences with respect to preferred terminology, identity-first language (e.g., “autistic adolescents”) and language describing individuals as “on the autism spectrum” will be used throughout this article given recent research showing the preferences of the autism community (Bury et al., 2020). Furthermore, we have chosen to utilize strength-based language with respect to neurodevelopmental diagnoses as rooted in the neurodiversity perspective (Brown et al., 2021).

Adolescence has been posited as a critical period for individuals with ND, where additional divergence from neurotypical development emerges, both in terms of achievement of developmentally normative tasks and neurobiological development (Picci & Scherf, 2015; Uddin et al., 2013). For

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example, accumulating evidence suggests that adolescents with ND may not exhibit or attain the most salient shifts of adolescence, such as social reorientation to peers, social acceptance in peer groups, and growth in executive functioning and cognitive control (Picci & Scherf, 2015; Rosenthal et al., 2013).

Given the developmental salience of adolescence and compounded risk conferred through the above processes, it is essential to explore resilience factors that positively promote adaptation in the adolescent period for youth with ND. However, literature reviews have noted that neurodiverse individuals have been neglected in the study of positive psychology constructs and have highlighted this as an important future direction (Blacher et al., 2013; Niemiec et al., 2017; Raley et al., 2021; Wehmeyer & Shogren, 2014). This is especially important given the recent shift in the neurodevelopmental community toward the empowerment and inclusion of autistic stakeholders in clinical and research decision-making (Fletcher-Watson et al., 2021). Only one study has examined positive psychology constructs, including hope, in adolescents with typical development as well as in adolescents with learning differences, the latter defined as being eligible for school special education services (Shogren et al., 2006). This study documented measurement invariance in adolescents with and without disabilities, paving the road for future study of hope in neurodiverse youth. Furthermore, Shogren et al. (2006) found that neurodiverse adolescents had lower levels of agency thinking (e.g., one's self-confidence, determination, and motivation to take and sustain action toward goals) than their neurotypical peers. Importantly, in this sample, hope significantly predicted life satisfaction for both students with and without disabilities (Shogren et al., 2006). Although an important foundation, the classification of students in the above study based on special education eligibility barred it from being able to well-characterize the sample.

Common characteristics and life experiences of individuals with ND suggest that these individuals may be at risk for lower levels of hope. For example, youth with autism spectrum disorder (ASD) and/or ID commonly exhibit greater challenges and a greater need for supports in the areas of executive functioning (Corbett et al., 2009; Danielsson et al., 2012) and problem-solving (Jackson & Dritschel, 2016; Wieland et al., 2014). Such struggles may interfere with all three components of hope: development of goals, identification of pathways, and sustained agency thinking and motivation. Furthermore, autistic individuals show differences in cognitive and behavioral flexibility (D'Cruz et al., 2013; Miller et al., 2015), such as in "set-shifting" tasks, where autistic individuals have more difficulties successfully adapting behavior to new rules

and situations. Following from this, youth on the spectrum may be more likely to benefit from supports in identifying alternative methods to achieve goals (i.e., pathways) and/or being willing to maintain effort after failure (i.e., agency thinking).

Beyond the neurocognitive profile of individuals with ND, children on the spectrum and/or with intellectual disabilities also demonstrate lower levels of self-determination (Chou, et al., 2017a, 2017b), though recent research has also demonstrated that race/ethnicity interacts with disability status in relation to self-determination (Shogren et al., 2018). Self-determination captures a complex set of skills, personal characteristics, and motivations that enable individuals to make choices and manage their lives (Chou, Wehmeyer, Shogren et al., 2017; Wehmeyer & Kelchner, 1995). Given this complexity, definitions of self-determination have shifted over time, though it has recently been conceptualized as a dispositional characteristic that can change with skills and experience, resulting in individuals acting as causal agents in their lives (Shogren et al., 2017). Additionally, children and adolescents with ND are also more likely than their neurotypical peers to need support academically (Estes et al., 2011), socially (Taheri et al., 2016; Tipton-Fisler et al., 2018), and emotionally (Dekker et al., 2002; Hansen et al., 2018). Taken together, lower levels of self-determination and pervasive challenges across life domains may serve to limit or erode hope for youth with ND.

Beyond potential group differences in youths' levels of hope associated with neurodevelopmental status, the construct of hope may also provide insight into developmental risk and protective processes for ND populations. Specifically, given that ND children are more likely to experience poor psychosocial outcomes, it is imperative to identify whether higher hope promotes positive outcomes in these marginalized populations, as it does in the general child population. Importantly, youth endorsement of hope could inform interventions toward improving outcomes for this marginalized group. Despite this potential, to our knowledge, the construct of hope has not yet been extensively examined in neurodiverse youth.

Meta-analytic research on adolescents has demonstrated large and robust relationships between hope and several other constructs, including positive affect, life satisfaction, social support, optimism, and self-esteem (Yarcheski & Mahon, 2016). In investigating hope in neurodiverse youth, it is essential to replicate these findings and consider correlates of hope on multiple levels: the individual, family, and community. Furthermore, it is plausible that different relational factors may hold differential value in predicting hope across different populations. For example, parenting and parent-child relationships have demonstrated greater influences on outcomes for children

with developmental risk (Baker et al., 2007; Norona & Baker, 2014).

One plausible construct is that of maternal optimism. Optimism, defined as a dispositional characteristic measuring whether people hold favorable expectations for the future, is differentiated from hope through the “generalized” nature of positive expectancies (e.g., future favorable outcomes may be due to luck, the actions of others, one’s own actions) while hope specifies beliefs in one’s own ability to achieve goals through self-initiated actions (Aларcon et al., 2013). Despite this distinction, higher optimism predicts proactive behavior, persistence, and effective coping within an individual (Carver et al., 2010). Following from research documenting how parents’ beliefs and behaviors exert strong influences on child development (Sigel et al., 2014), maternal optimism specifically has been linked to child outcomes such as peer competence and adjustment, as well as both internalizing and externalizing difficulties (Castro-Schilo et al., 2013; Jones et al., 2002). Optimism and hope have demonstrated significant correlations within individuals in adolescent and adult samples (Vacek et al., 2010; Youssef & Luthans, 2007); however, the relationship between maternal optimism and child hope is not yet well understood.

Maternal parenting behaviors in early childhood also have long-term impacts on youth outcomes (Moody et al., 2019; Raby et al., 2015). One possibly potent behavior is scaffolding, where parents engage with and assist their child in completing tasks. Effective scaffolding provides the “just right” amount of support, with the ultimate goal of promoting independence and success in goal-directed activities (Mermelstine, 2017). Scaffolding can encompass behaviors that are technical (e.g., guidance toward solutions, structuring a task), motivational (e.g., supporting maintained focus, reinforcing effort), or emotional (e.g., creating a positive experience, sense of achievement) in nature (Baker et al., 2007). Overall, maternal scaffolding has been associated with positive child outcomes, such as improved social competence, prosocial helping behavior, self-regulation in both children with and without ND (Baker et al., 2007; Hammond & Carpendale, 2015; Neitzel & Stright, 2003; Spruijt et al., 2018; Ting & Weiss, 2017). It is likely that youth of parents who utilized effective scaffolding were guided toward new approaches to tasks, praised for their sustained efforts, and supported in successfully achieving goals, all of which likely served to reinforce hope. However, how maternal scaffolding relates to children’s development of hope has not yet been examined, in either neurotypical or ND populations.

Beyond the family system, youth with greater social support also tend to have higher levels of hope (Valle et al., 2004; Yarcheski & Mahon, 2016). However, the relationship between an individual’s social skills and hope is less well-studied. There is evidence that strengths in social skills

are positively correlated with self-efficacy (Salavera et al., 2017), as well as with future increases in social support, which also buffers against psychological distress (Segrin et al., 2016). Youth with strengths in social skills may also endorse higher hope, through perceived enhanced pathways toward goals. This may be evident in how social skills equip youth to resolve conflicts in social relationships, flexibly adapt social strategies to context, and generate new avenues toward social goals.

Conversely, negative peer relationships, especially childhood bullying and victimization, have been associated with an increased risk of adverse outcomes in the areas of physical health, mental health, and academic achievement (Moore et al., 2017). Moreover, adolescents who experience bullying report feelings of helplessness (DeLara, 2012; Siyahhan et al., 2012), which can serve to perpetuate peer victimization (Kochel & Rafferty, 2020). As such, the experiences of being bullied in adolescence may erode hope, as students’ sense of control and success in relation to social goals decline. It is plausible that diminished hope may be an explanatory factor in the long-term adverse effects of victimization experiences into adulthood (Wolke & Lereya, 2015). Ultimately, understanding such processes is especially important for youth with ND who often have differences in social skills (American Psychiatric Association, 2013) and frequently experience rejection and victimization (Son et al., 2012; Tipton-Fisler et al., 2018).

The above summary of the current research on hope highlights a need for further research on the construct of hope in neurodiverse (ND) youth. Thus, the primary aim of the current study was to compare levels of hope in neurodiverse and neurotypical adolescents, with the hypothesis that ND adolescents would endorse lower levels of hope as compared to neurotypical peers. Importantly, we recognize that within the broader category of neurodevelopmental disabilities, there is a wide range of clinical presentations. As such, we also will test whether differences exist among two different neurodevelopmental groups: those on the autism spectrum and those with intellectual disabilities. As a secondary aim, we sought to replicate the research linking hope to positive outcomes, such as mental health and quality of life, in ND populations. We expected that the two ND populations would show similar relationships as observed in neurotypical populations. Lastly, in a tertiary and exploratory aim, we assessed multiple relational correlates and predictors of hope, including maternal optimism and scaffolding, youth social skills, and peer victimization. Given prior research documenting the heightened impact on psychosocial factors on outcomes in ND youth, we hypothesized that neurodevelopmental status would significantly moderate these relationships with stronger associations in the ND group as compared to the NT group.

Methods

Participants

Participants were drawn from a longitudinal study conducted across three university sites: University of California, Los Angeles, University of California, Riverside, and Pennsylvania State University. Participants included 185 adolescents who were assessed at approximately age 15 ($M_{\text{age}} = 15.41$, $SD = 0.70$), and their mothers. Overall, the full sample of adolescents was 60.5% male ($n = 112$) and 39.5% female ($n = 73$). There were 105 White participants (56.8%), 29 Hispanic participants (15.7%), 15 Black participants (8.1), and 3 Asian-American participants (1.6). An additional 33 participants (17.8%) identified as “Other” with respect to racial and ethnic identity. Families of diverse socioeconomic and educational backgrounds were represented, with about half slightly more advantaged; 54.2% of families reported annual incomes above \$70,000, and 56.3% of mothers reported achieving a bachelor’s degree equivalent or higher.

Participants were classified as neurodiverse (ND: $n = 89$) or neurotypical (NT: $n = 96$) based on historical assessment data collected at age 13 as part of the broader longitudinal study. The historical assessment included measures of cognitive functioning using an abbreviated version of the WISC-IV (Wechsler, 2003) and of adaptive skills using the Vineland Scales of Adaptive Behavior-2nd Edition (VABS-2; Sparrow et al., 2005). Through this assessment, 24 participants clearly met diagnostic criteria for intellectual disability (ID; standard scores in both cognitive and adaptive behavior domains < 70). An additional 13 participants were identified as having below average skills (standard scores < 85) in both domains. Of note, the most recent version of the DSM-5 has de-emphasized the use of strict IQ score cutoffs to determine the diagnosis of intellectual disability, while prior research has demonstrated significant functional impairments in borderline intellectual functioning populations (BIF; IQs 71–84) and clinical similarities to those with ID (Emerson et al., 2010; Fenning et al., 2007; Peltopuro et al., 2014). Furthermore,

researchers have continued to advocate for recognition of BIF as a distinct disorder (Wieland & Zitzman, 2016) or for BIF to be included in the broader ICD diagnostic category of intellectual developmental disorder (IDD; Greenspan, 2017). Considering these factors, all 37 participants were grouped together into one larger group of adolescents with impairments related to cognitive and adaptive skills; for clarity, this group will be labeled IDD for the remainder of the paper. Autism diagnostic classification was determined by parent report of adolescent’s autism diagnosis by a professional, accompanied by history of receiving services for autistic youth. Our autism sample consisted of autistic adolescents with average or above-average cognitive abilities ($n = 29$) as well as autistic adolescents with below-average cognitive abilities ($n = 23$).

Table 1 shows the demographic characteristics of the adolescents and families. As compared to the NT group, the ND group had a significantly higher proportion of males, which was likely influenced by documented gender discrepancies in the prevalence of ASD (Werling & Geschwind, 2013).

Procedures

The Institutional Review Boards of the participating universities approved all procedures. All participants and their parents/legal guardians assented and consented, as appropriate, to all study procedures. The study drew upon longitudinal data collected at previous study time points (e.g., Baker & Blacher, 2020; Baker et al., 2002). In brief, the initial recruitment phase included children at age 3 with or without developmental delays. While there were some autistic youths in this initial sample, a larger sample of autistic youth were recruited at age 13 to join the study. Eight comprehensive assessments occurred from ages 3 to 13, prior to the 15-year assessment, which the current study largely focuses on.

At age 15, parents and adolescents came to the research center for an assessment session lasting 2–3 h. Specific to the present study, parents completed self-report questionnaires on their own optimism and family demographics, as well as informant reports on their child’s mental health, social skills, and peer victimization experiences. Adolescents completed

Table 1 Sample demographics for neurotypical (NT) adolescents and adolescents with neurodevelopmental differences (ND)

	NT ($n = 96$)	ND ($n = 89$)	t or χ^2
Gender (% male)	51.6%	69.7%	6.28*
Race (% White)	58.9%	53.4%	0.57
Family income (% < 70 k/year)	41.1%	51.2%	1.85
IQ	108.5 (12.3)	80.5 (24.1)	9.63***
VABS-II Adaptive Behavior Composite	97.1 (9.2)	74.5 (10.1)	15.24***

Group differences in gender, race, and family income between NT and ND were assessed by dichotomizing these demographic variables. Of note, no participants identified as transgender or nonbinary. * $p < .05$; ** $p < .01$; *** $p < .001$

self-report measures of hope, quality of life, and peer victimization experiences. Participants with neurodevelopmental differences were provided with comprehension support as needed (e.g., reading questions aloud, visual aides to display Likert scales).

Measures

Children's Hope Scale (Snyder et al., 1997)

The Children's Hope Scale (CHS) is a six-item self-report questionnaire that assesses hope in youth ages 8 to 16 years. Items utilize a Likert scale from 1 (*none of the time*) to 6 (*all of the time*), with higher total scores indicating greater hope. The CHS has demonstrated adequate internal reliability, test–retest reliability, and construct validity through associations in the expected directions with self-worth, achievement, and depression (Snyder et al., 1997). In addition, hope has shown divergent validity with intelligence, gender, age, and race (Snyder et al., 1997). In the current study, adolescents completed the CHS at the age 15 assessment time point. The CHS had adequate reliability in each of our three neurodevelopmental groups (i.e., NT, IDD, ASD), with alphas ranging from 0.70 to 0.86.

Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001)

The CBCL is a widely used parent-report questionnaire with strong psychometric properties, assessing youth behavioral and emotional functioning. The child/adolescent version (ages 6–18) of the CBCL was administered, along with a corresponding self-report form (Youth Self-Report; Achenbach & Rescorla, 2001). Each form has 118 items rated on a scale of 0 (*not true*) to 2 (*very true or often true*). The CBCL yields multiple scores; however, the present study utilized the *T*-score for the Internalizing behavior problems scale. The Internalizing behavior problems scale is reported to have a high internal consistency ($\alpha_{\text{CBCL}} = 0.90$; $\alpha_{\text{YSR}} = 0.90$; Achenbach & Rescorla, 2001).

Youth Quality of Life—Short Form (YQOL-SF; Ayala et al., 2014)

The YQOL-SF is a 10-item self-report measure designed for youth ages 11–18 years old (Patrick et al., 2002). Items assess self-perceptions of youth's social relationships, sense of self, and general quality of life, using a rating from 0 (*not at all*) to 10 (*very much*). In the current sample, each of the three neurodevelopmental groups demonstrated adequate

reliability on the YQOL-SF, with alphas ranging from 0.72 to 0.81.

Life Orientation Test—Revised (Scheier et al. 1994)

The Life Orientation Test—Revised (LOT-R) consists of six coded items and four distractor items. It assesses dispositional optimism on a 5-point Likert scale from 0 (*strongly disagree*) to 4 (*strongly agree*). Three negatively worded items are reverse scored, and responses are summed for scoring. The LOT-R demonstrates strong reliability and validity in psychometric examination (Scheier & Carver, 1992; Scheier et al., 1994). Alpha for the present sample of mothers during the age 15 assessment of their children was 0.84.

Maternal Scaffolding Coding System (Maslin-Cole & Spieker, 1990)

Maternal scaffolding was coded from parent–child interactions at age 4 during problem-solving tasks (e.g., puzzles, mazes), in which mothers were instructed to allow their child to independently try each task and then provide whatever help their child needed. Using a 5-point scale, the Maternal Scaffolding Coding System captured three dimensions of scaffolding behaviors: technical, emotional, and motivational. Intraclass correlation coefficients for the scaffolding dimensions ranged from 0.84 to 0.90, demonstrating high inter-rater reliability (for more information on coding procedures, please see Baker et al., 2007). A composite score was created by averaging all three forms of scaffolding across the multiple tasks presented.

Social Skills Improvement System (SSIS) Rating Scales (Gresham & Elliott, 2007)

Parents completed the secondary school form of SSIS at the youth age 15 timepoint. The Social Skills domain score was utilized in the current study, capturing social competence constructs including cooperation, communication, empathy, self-control, responsibility, engagement, and assertion. The SSIS demonstrates adequate convergent validity and internal consistency, with the Social Skills scale reaching an alpha of 0.96 in the standardization sample (Gresham et al., 2011).

Bullying Questionnaire (Juvonen et al., 2000)

The Bullying Questionnaire is used to assess the frequency and types of peer harassments in adolescence. It has adequate reliability with middle schoolers aged 12–15 years (Juvonen et al., 2000). A parent- and self-report version each have 9 items using a 5-point scale representing frequency

(0 = *never* to 4 = *almost every day*) of victimization experiences, such as being threatened, called names, or socially excluded. We adapted the measure to include online bullying behaviors. In this study, both parent and youth reports had high internal consistency, with alpha values of 0.91 and 0.83 respectively.

Data Analyses

All data analyses were performed with IBM SPSS Statistics, Version 27, using listwise deletion to handle missing data. To complement findings of internal consistency as reported in the methods, brief replication of discriminant validity findings using the ND samples were planned to support the use of the CHS in neurodiverse populations. We planned to examine the relationship between hope and various demographic variables, specifically IQ, gender, and maternal education. An ANCOVA model for each demographic variable was conducted, in which the demographic variable of interest, the three-level ND group categorical variable, and the interaction term were entered and analyzed.

Next, to assess our primary aim as described in the introduction, group differences in hope by neurodevelopmental status (i.e., NT, ND) and neurodevelopmental group (i.e., NT, ASD, IDD) were examined using independent samples *t*-test and one-way ANOVA, respectively. To test our secondary aim replicating the relationship between hope and psychosocial outcomes in neurodiverse groups, univariate ANCOVAs were conducted. We investigated whether hope was related to outcomes of concurrent internalizing symptoms and quality of life in adolescence, as well as whether these relationships differed by the neurodevelopmental group. Separate models were run using both parent-reported and self-reported internalizing symptoms. In each model, the three-level neurodevelopmental group (i.e., NT, IDD, ASD) variable, self-reported hope, and the interaction between these two variables were entered.

Finally, given hope's possible relation to other important youth outcomes, correlates of hope were also explored using ANCOVAs to address our third exploratory aim, with interaction terms included to detect differences in correlates by the neurodevelopmental group. In these models, the hypothesized correlate, the three-level neurodevelopmental group variable, and the interaction term were entered. Separate models were conducted for each proposed correlate: maternal optimism, maternal scaffolding, social skills, and peer victimization. In all of these models, adolescent self-reported hope was utilized as the outcome. ANCOVA models with significant interactions were probed to examine simple slopes in individual groups. Throughout the above analytic plan, separate ANCOVA models for each variable of interest were chosen over a comprehensive single model with all variables of interest entered simultaneously. As one

of the first papers examining these relationships in neurodiverse populations, this method was selected given our exploratory interest in examining whether variables functioned differently across neurodevelopmental groups (e.g., interaction terms).

Results

Validity in Neurodiverse Populations

Analyses were conducted to assess divergence with other constructs, similar to prior research validating the Children's Hope Scale (Snyder et al., 1997). No significant interaction between the neurodevelopmental group (i.e., NT, IDD, ASD) and estimated Full-Scale IQ, $F(2,163) = 2.21$, *ns*, was identified in relation to hope in an ANOVA model, suggesting that the relationship between hope and IQ is similar across neurodevelopmental and neurotypical groups. In a subsequent regression inclusive of the entire sample, IQ was not significantly predictive of adolescent hope scores, $t(167) = 0.61$, *ns*. These results suggest that for youth with NT, ID, and ASD in the current sample, hope was independent of IQ. Similarly, there was no significant interaction between the neurodevelopmental group and gender, $F(2,178) = 0.91$, *ns*, or between the neurodevelopmental group and maternal educational attainment, $F(2,177) = 0.69$, *ns*, in relation to hope. In models examining main effects of these variables on adolescent hope, neither gender, $F(1,182) = 1.04$, *ns*, nor maternal educational attainment, $t(181) = 0.38$, *ns*, emerged as significant. Overall, these findings, in conjunction with the adequate reliability in this sample, support that the construct of hope can be measured with validity through self-report in ND populations.

Group Differences in Hope

When collapsing those with either ASD and/or IDD into a broader neurodevelopmental difference (ND) group, an independent samples *t*-test indicated that adolescents with ND self-reported significantly lower hope ($M = 24.8$, $SD = 5.6$) than their NT peers ($M = 27.3$, $SD = 4.9$), $t(183) = 3.31$, $p = 0.001$. Autistic youth with average or above-average intellectual functioning did not differ from autistic youth with below-average intellectual functioning with respect to hope, $t(50) = 0.49$, *ns*, and were thus combined in all subsequent analyses. A one-way ANOVA revealed significant group differences by neurodevelopmental status when comparing across youth with NT, IDD (inclusive of borderline intellectual functioning), and ASD (with or without cognitive deficits), $F(2,182) = 6.34$, $p = 0.002$, with a moderate effect size, $\eta^2_p = 0.07$. Post hoc analyses indicated that NT adolescents ($M = 27.3$, $SD = 4.9$) endorsed significantly

higher levels of hope than adolescents with ASD ($M=24.2$, $SD=4.8$), $p=0.002$. Adolescents with IDD fell between NT and ASD groups, with self-reported levels of hope ($M=25.6$, $SD=6.5$) that did not significantly differ from either group.

Hope as a Protective Factor

For all youth, regardless of the neurodevelopment group, the relation between hope and *parent-reported* internalizing symptoms was nonsignificant. When utilizing *self-reported* internalizing symptoms as the outcome, the interaction term was nonsignificant, $F(2,178)=1.98$, *ns*. However, in this model, hope exerted a significant main effect on *self-reported* internalizing symptoms, $F(1,178)=12.35$, $p=0.001$, over and above neurodevelopmental group status, again with a medium effect size, $\eta^2_p=0.07$. The direction of this effect indicated that, regardless of neurodiversity, adolescents who endorsed higher hope reported experiencing fewer internalizing symptoms.

Similar to internalizing symptoms, there was a significant main effect of hope, over and above neurodevelopmental group, on self-reported quality of life, $F(1,179)=57.05$, $p<0.001$, with a large effect size, $\eta^2_p=0.24$. Adolescents who reported higher levels of hope also reported a higher quality of life. In this model, the interaction term was marginally significant, $F(2,179)=2.89$, $p=0.058$. Given the marginal interaction, simple slopes were probed for exploratory purposes. Simple slopes revealed that for all groups, the relationship was significant and positive, with the effect sizes for the ASD ($\eta^2_p=0.14$) and NT ($\eta^2_p=0.14$) groups being larger than the IDD group ($\eta^2_p=0.03$). In comparing the simple slopes, only the discrepancy between the ASD and IDD groups rose to significance, $p=0.018$, such that the ASD group displayed a stronger relation between hope and quality of life than did the IDD group.

Correlates of Hope

With respect to maternal optimism as a correlate, a marginally significant interaction emerged between maternal optimism and neurodevelopmental group, $F(2,174)=2.35$, $p=0.099$. In probing the simple effects of maternal optimism on hope for each neurodevelopmental group, results indicated that maternal optimism at age 15 was significantly and positively associated with adolescents' self-reported hope for the NT group only, $p=0.015$.

Using the previous longitudinal study data from childhood, during which time only two groups (NT and IDD) were included, we conducted additional analyses to determine whether maternal scaffolding in childhood predicted hope in adolescence. Results showed that maternal scaffolding at child age 4 significantly predicted youth hope in

adolescence, $F(1,104)=4.29$, $p=0.041$, $\eta^2_p=0.05$, over and above neurodevelopmental group, which was nonsignificant in the model. Specifically, when mothers utilized more scaffolding in problem-solving tasks, their children later self-reported higher levels of hope in adolescence, and this was true for both the NT and IDD groups.

Social skills, as measured by the SSIS and rated by participants' mothers, emerged as a significant correlate of adolescent hope. Youth with greater social skills also had greater levels of hope, $F(1,173)=4.33$, $p=0.039$; however, this demonstrated a small effect size, $\eta^2_p=0.02$. There was no significant interaction in this model, suggesting that this effect was the same for all three groups. In contrast, across all youth, adolescents' peer victimization experiences did not significantly relate to adolescents' hope when using either mother report, $F(1,173)=1.97$, *ns*, or self-report, $F(1,179)=1.51$, *ns*.

Discussion

We examined levels of hope, its predictors, and its role as a protective factor during adolescence for neurotypical youth (NT) and neurodiverse youth (ND). Results support that hope can be validly and reliably measured via self-report in adolescents with neurodevelopmental differences. Our primary aim was to determine whether there were group differences in hope among adolescents with NT and those with ND. In the current sample, the results indicated that adolescents with ND indeed endorsed significantly lower levels of hope than NT youth, replicating previous findings (Shogren et al., 2006). When examining differences across the three neurodevelopmental groups (NT, IDD, ASD), autistic adolescents expressed significantly less hope than the NT peer group, while adolescents with IDD did not differ from either the ASD or NT group.

Thus, the present findings suggest that, overall, neurotypical adolescents report higher hope than those with ND, especially as compared to autistic adolescents. It is possible that the unique clinical profile of ASD, including greater inflexibility and differences in social communication controlling for developmental level as compared to ID populations (APA, 2013), may explain this increased risk. For example, room for growth in "flexible thinking may also indicate a need for support with creative idea generation, problem-solving, and adaptation following failure, all of which are plausibly related to hope. Although some individual characteristics may relate to hope, it is also important to highlight the interaction between individual and environmental factors. For example, lack of awareness and acceptance of autism-related social communication differences may lead individuals with ASD to experience greater rates of social isolation and rejection

than other disability groups (Taheri et al., 2016; Tipton-Fisler et al., 2018), despite strong interest in developing and maintaining social relationships (Cresswell et al., 2019; Sedgewick et al., 2016). Additionally, though both IDD and ASD can present as “invisible disabilities,” this phenomenon may be more pronounced for autistic youth who are in general education settings and are perceived as academically at grade level. Individuals with invisible disabilities report experiencing ableist microaggressions and discounting of their disability (Olkin et al., 2019). Furthermore, hesitancy to disclose autism is common due to fear of stigma (Thompson-Hodgetts et al., 2020), which can hinder access to needed supports and increase likelihood of negative attributions to behavior.

Our secondary aim was to evaluate whether previously established relationships between hope and positive child outcomes could be replicated in youth with ND. Our results showed that, for all neurodevelopmental groups, hope displayed a significant relationship with self-reported internalizing symptoms and quality of life, such that adolescents who reported higher hope endorsed fewer internalizing problems and greater quality of life. Of note, this relationship did not emerge when using parent-reported internalizing symptoms. The self-report findings are consistent with prior research in the general population where hope was found to be positively correlated with adolescents’ global life satisfaction and negatively correlated with internalizing mental health problems (Valle et al., 2004). As such, the current study extends the importance of hope for adolescent well-being to neurodiverse adolescents, particularly as self-assessed. Furthermore, given that youth with ASD/IDD are at increased risk for internalizing problems (Baker & Blacher, 2020) and lower quality of life (Simoës & Santos, 2016; van Heijst & Geurts, 2015), these findings point to hope as a potentially potent protective factor for these persons. Notably, the connection between hope and quality of life was significantly stronger for youth on the spectrum than for youth with IDD.

The final aim of the current study was to examine correlates and predictors of hope, including whether these relations were moderated by developmental status. Indeed, such moderation approached significance for maternal optimism, with results indicating maternal optimism was significantly and positively associated with adolescent hope, but only in neurotypical youth, while no association was observed for either ND group. This finding is somewhat inconsistent with prior research indicating the importance of parenting for children with ND (Baker et al., 2007; Norona & Baker, 2014) and specifically the benefits of optimism within family systems of children with ND (Baker et al., 2005). However, when considering the societal marginalization that youth with ND face, it is possible that the impact of maternal optimism on child hope may be dampened. Alternatively,

youth with ND may also be less sensitive to the personal attitudes or beliefs of others due to the nature of their disorders (Baron-Cohen, 2000).

Another parenting factor examined was maternal scaffolding in early childhood. The children whose mothers utilized more effective scaffolding behaviors in problem-solving tasks at child age 4 had significantly higher hope as adolescents, 11 years later. As discussed above, scaffolding likely serves to increase children’s felt sense of achievement and efficacy, through supported successes. It is possible that the development of hope undergoes a critical period early in development, in which hope is readily shaped by environmental factors. The current results imply that hope may be malleable and responsive to parent-mediated interventions in the preschool period. These findings again emphasize the role of the environment in shaping the outcomes for both neurodiverse and neurotypical individuals.

Additionally, we found social skills to be a significant correlate of hope, with no interaction across neurodevelopmental groups. Adolescents with greater social skills, as reported by parents, also tended to endorse greater levels of hope. Social savvy is useful in the pursuit of goals, in terms of garnering necessary support, cooperating within teams, resolving conflict, asserting oneself, and navigating systems. In adolescence specifically, individuals may also set goals that are social in nature (e.g., making friends, joining clubs), given the increased importance of peer acceptance and affiliation in this developmental period (van Harmelen et al., 2017). This link between social skills and hope further reinforces the above-discussed hypothesis that the differences in social communication observed in ASD may partially explain the significant group differences, such that autistic adolescents reported significantly lower hope than their neurotypical peers. Surprisingly, experiences of peer victimization did not relate to hope in the current study. Though unexpected, these results are encouraging, in that they suggest that hope may be insulated and independent from the effects of negative peer interactions.

Limitations and Future Directions

The present study had several strengths, including the use of multiple informants and multiple comparison groups. However, it was limited by the relatively small sample sizes, especially in the two ND groups (i.e., ASD, IDD). In particular, with a larger sample size, we may have been able to more closely examine differences between autistic adolescents with and without cognitive impairments. Future researchers could purposely recruit to address such comparisons across various ND populations. An additional limitation was present in that only two neurodevelopmental groups (i.e., NT, IDD) could be included in the analysis examining childhood maternal scaffolding as a predictor of later adolescent hope,

given the nature of the original longitudinal sample. Thus, we were unable to draw conclusions related to how maternal scaffolding may specifically benefit autistic children. Future research should replicate the current findings and extend them to autistic populations, as well as other to other neurodiverse populations. As part of a larger longitudinal study, the current study was also limited in its ability to measure all possible constructs of interest. Additional research could expand on the current study through the examination of other variables previously associated with hope in the general population (e.g., academic achievement) or related to the neurocognitive profiles of neurodiverse individuals (e.g., executive functioning). Furthermore, although maternal optimism was explored in relation to hope, paternal or individual optimism would also be worthy of investigation.

In sum, the current study underscores the importance of hope in adolescence for all youth, including those with neurodiversity. Hope showed significant associations with important outcomes for youth, including internalizing symptoms and quality of life, regardless of neurodevelopmental differences (ND). Furthermore, current findings suggest that youth with neurodevelopmental differences (ND), and especially autistic youth, are at risk for experiencing lower levels of hope. A primary implication would be to both employ screening tools to identify individuals with lower hope and to implement interventions to augment hope in this already marginalized population. One such avenue would be to draw upon pre-existing evidence-based social skills and parenting intervention programs to reduce disparities in hope, given hope's observed connections to social skills and maternal scaffolding in the current study. Alternatively, prior research has also demonstrated the efficacy of interventions specifically developed to raise hope in neurotypical adolescents and adults (Feldman & Dreher, 2012; Marques et al., 2011; Weis & Speridakos, 2011). However, such hope-specific interventions must first be tested in ND populations and, if successful, implemented within service delivery systems for ND individuals.

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Data Availability Data are not available via a data repository due to a lack of informed consent for data sharing.

Declarations

Ethics approval All procedures were approved by the relevant Institutional Review Boards at participating universities, with primary IRB approval obtained from the University of California, Los Angeles and reliances obtained from the University of Riverside, California and Pennsylvania University.

Informed consent All adolescent participants and their parents/legal guardians assented and consented, respectively, to all study procedures and research publication.

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