Daily Adolescent Purposefulness, Daily Subjective Well-being, and Individual Differences in Autistic Traits

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Abstract

Despite being a valued resource for adolescent health and development, the field maintains an incomplete view of how youths' sense of purpose in life corresponds with their subjective well-being (SWB; i.e., greater life satisfaction and positive affect, lower negative affect). These blind spots are especially noticeable at the daily level, and the field further fails to consider how daily associations between purpose and SWB might vary across important individual differences. This study addresses these gaps in the literature using a daily diary approach to track adolescents (N = 204; M_{age} = 16.42 years; 70.1% female) across approximately 70 days of enrollment in *GripTape*, a U.S.-based out-of-school time program that supports engagement with personally meaningful activities. We found that on days teens felt more purposeful than usual, they tended to report greater SWB. Moreover, we failed to find evidence that subclinical autistic traits, an individual difference that corresponded with lower daily SWB ratings, moderated the observed daily benefits of feeling more purposeful than usual. With one of the longest consecutive studies of youth well-being to date, our work shows that day-to-day fluctuations in purpose are a useful addition to the adolescent SWB landscape. Following this necessary observational groundwork, future research may invest in creating and testing purpose opportunities for a more inclusive range of youth.

Keywords: Adolescence, purpose in life, subjective well-being, individual differences, autistic traits

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Contemporary psychological science generally looks to two dominant paradigms to describe well-being: the hedonistic perspective and the eudaimonic perspective (for review, see Ryan & Deci, 2001). In short, hedonistic theories of well-being describe pleasure and happiness as it is experienced by the individual (Kahneman et al., 1999). Comprising assessments of life satisfaction, positive affect, and negative affect, subjective well-being (Diener, 1984) is among the most widely-accepted frameworks for studying hedonia. In contrast, eudaimonic perspectives de-emphasize the manifest positive feelings entailed in subjective well-being; rather, they argue that living life consistent with one's true self—or *daemon* in Aristotelian terms—is the route to flourishing (Waterman, 1993). Like hedonic well-being, eudaimonic well-being is often approximated by studying psychological well-being and its six constituent parts: positive relationships with others, self-acceptance, personal growth, environmental mastery, purpose in life, and autonomy (Ryff, 1989; Ryff & Keyes, 1995). Although highly related, subjective well-being and psychological well-being are conceptually and empirically separable (e.g., Chen et al., 2013; Ryan & Deci, 2001), and there is emerging evidence that while psychological well-being may predict increases in subjective well-being over time, the reverse may not hold true (Joshanloo, 2019). Thus, identifying and living in accordance with the true self appears to be important for the "happy life" that many people strive for (Oishi et al., 2020).

One aspect of psychological well-being, a sense of purpose in life, may hold special relevance for the critical developmental period of adolescence. Indeed, purpose has been nominated as a fundamental resource for adolescents given its demonstrated support of identity development (Bronk, 2011; Hill & Burrow, 2012) and theorized role as a developmental asset for

the teenage years and beyond (e.g., Damon et al., 2003; Ratner & Burrow, 2019; Scales et al., 2000). Moreover, in contrast to the conceptually similar and reflective construct of meaning in life (Hill et al., 2018; Ratner et al., 2021), the prospective nature of purpose (Bronk & Mitchell, 2022) dovetails with adolescents' characteristically hopeful thinking as they begin to make choices about who they are and who they want to be in the future (Hill & Burrow, 2021; Snyder, 2000).

In the present study, we review literature on the known benefits of sensing purpose in life in adolescence to (a) examine how subjective well-being responds to within-person fluctuations in daily purposefulness using one of the most intensive studies of these constructs to date; (b) outline these associations within the context of out-of-school time programming that may support youth purpose development; and (c) explore these processes when considering subclinical autistic traits, an individual difference in the general population (e.g., Ruzich et al., 2015) that tends to correspond with lower sense of purpose ratings, poorer global well-being, and muted pleasure (e.g., Novacek et al., 2016; Ratner & Burrow, 2018; Stimpson et al., 2021). In doing so, we will not only investigate the robustness of previous within-person purpose findings, but we may also inspire future work that aims to support psychosocial development among a more inclusive range of youth.

Dispositional and Daily Purpose in Adolescence

Purpose in life is defined as a distal aim that organizes, stimulates, and guides the selection of short- and long-term goals (McKnight & Kashdan, 2009; Ryff, 1989). Considerable evidence points to cognitive, health, behavioral, and psychological benefits for those possessing a greater sense of purpose at the dispositional level (for review, see Pfund & Hill, 2018). For adolescents, the benefits and relevance of purpose for healthy development may be especially

profound (e.g., Dahl et al., 2018; Damon et al., 2003). Purpose is among several assets that support youth thriving, including the development of a positive identity (Benson et al., 2011; Mariano & Going, 2011; Scales et al., 2000). Indeed, purpose is theorized to help guide identity exploration by empowering youth with agency (Hill et al., 2013) and allowing them to make strategic choices (Bronk, 2011; Hill & Burrow, 2012). Sensing purpose in life may also position youth to capitalize on their life experiences, thereby increasing the likelihood they develop qualities that enable successful aging later in life, like wisdom (Ratner & Burrow, 2019). Beyond the developmental implications of sensing purpose, benefits extend to young people's subjective well-being. Consistent with evidence from older adults (e.g., Pfund et al., 2021), late adolescents and emerging adults who report greater commitment to their overall purpose in life tend to report greater life satisfaction, greater positive affect, and lower negative affect (Bronk et al., 2009; Sumner et al., 2015). Furthermore, as purpose is a central feature of psychological well-being and eudaimonia (Ryff & Keyes, 1995), relevant are findings suggesting that authenticity—or the sense one is living and acting consistently with their "true self" (Ullman, 1987)—mediates the association between psychological needs satisfaction (i.e., autonomy, competence, and social relatedness; Ryan & Deci, 2000) and subjective well-being in adolescence (Thomaes et al., 2017).

In addition to dispositional purpose supporting subjective well-being in adolescence and adulthood, there is emerging work on the benefits of sensing purpose at the daily level. Among adults, daily purposefulness (Hill et al., 2021) and purpose effort (Kashdan & McKnight, 2013) tend to be associated with lower daily negative affect and higher daily positive affect. These daily associations between purpose and subjective well-being appear to mirror those observed among adolescents. In a 14-day study of Asian American youth, Kiang (2012) found that on days

participants reported greater daily purposefulness, they also tended to report lower distress and greater happiness. The positive link between authenticity and subjective well-being also persists among adolescents at the daily level (Thomaes et al., 2017). Considering the evidence in this section together, purpose appears to have both dispositional (between-person) and daily (within-person) properties that predict subjective well-being. In addition to extending what is known about the unique contributions of dispositional and daily purpose to well-being, investigating these associations among more diverse samples of adolescents, in developmentally supportive contexts, and at more intensive intervals of study stands to fortify existing literature.

Purpose Development in Context

Purpose development inherently happens within context (Bronfenbrenner, 1979; Burrow et al., 2021), and youth programs are one such context that can support young people in developmentally-sensitive ways (Roth & Brooks-Gunn, 2016). In general, successful youth programs tend to be long-term, feature positive and supportive youth-adult relationships, and cater to internal developmental assets and competencies (e.g., positive identity, positive values, academic skills, commitment to learning; Scales et al., 2000). These features are particularly helpful in programs that allow youth to have active positions in the program and successfully navigate "real challenges" (p. 442; Roth et al., 1998). For example, on the roles of positive relationships and empowerment, Serido and colleagues (2011) surveyed over 700 adolescents enrolled in youth programs emphasizing youth-adult partnerships. They found that quality of the youth-adult partnership predicted the development of youth voice which, in turn, enhanced perceived benefits of the program itself. On the constructive role of encountering challenges, Oyserman's Identity-Based Motivation model (2007) posits that identity-congruent challenges are more likely to be perceived as worthwhile and meaningful to overcome, whereas identity-

incongruent challenges are often perceived as discouraging and stand to increase perceived activity-identity mismatch. Thus, in addition to personally-expressive activities having well-being benefits themselves (Hooker et al., 2020; Palen & Coatsworth, 2007), identity-congruent activities may increase developmental opportunities by way of intrinsic investment in challenges.

One framework for understanding how dispositional purpose may develop in youth programs is Liang and colleagues' (2017) "Four P's of Purpose" model. Through interviews with young people enrolled in a college preparatory program, Liang and colleagues suggest that purpose flourishes in situations where youth (1) have *people* who support them and believe in their abilities; (2) know the *prosocial benefits* of their intentions; (3) feel like they have a natural talent or *propensity* for their purpose-salient activities; and/or (4) articulate *passion* for the endeavor itself. Furthermore, programs with self-directed components may be in an especially advantageous position for supporting youth purpose through psychological needs attainment (Schweder & Raufelder, 2021). This idea is reinforced by evidence that feeling fulfilled in one's psychological needs tends to have implications for downstream youth authenticity and subjective well-being (Thomaes et al., 2017). Indeed, among youth participating in student leadership activities, later benefits for sensing purpose in life are more likely if the teen ascribes personal meaning to these activities (Bundick, 2011). Therefore, youth programs may optimize development when they (a) encourage youth to act in identity-congruent ways and pursue the topics they are passionate about; (b) nurture youth autonomy and competence; and (c) provide supportive and empowering youth-adult partnerships. These programs may be among the richest contexts to observe the nuanced ways daily youth purpose relates to subjective well-being. This is especially true given recent frameworks that propose iterative daily-level increases in

purposefulness may eventually accumulate in lasting dispositional, or trait-level, changes in one's sense of overall purpose (Hill et al., in press).

Potential Variation in Purpose Development and Experience

A final point to consider when thinking about the association between adolescent purpose and subjective well-being is: *for whom might this association be strongest?* Purpose acquisition is heterogeneous and may have differential consequences depending on an individual's unique developmental context (Burrow et al., 2021; Sumner et al., 2018). One individual difference known to relate negatively to psychosocial development, as well as hedonic and eudaimonic well-being, is subclinical autistic traits (e.g., Ratner & Berman, 2015; Ratner & Burrow, 2018; Stimpson et al., 2021). Like Autism Spectrum Disorder (ASD), subclinical autistic traits are a collection of behavioral and cognitive patterns, including poor social skills, preference for routine, difficulties with attention switching, problems with imagination, and preoccupation with numbers/patterns (e.g., Hoekstra et al., 2011). Consistent with the disorder's characterization as a spectrum, autistic traits in the general population are continuously distributed (e.g., Ruzich et al., 2015), relatively stable (Robinson, Munir, et al., 2011), and follow the same etiologic blueprints of clinical pathology (Robinson, Koenen, et al., 2011). Autistic traits are also distinguishable from personality (Wakabayashi et al., 2006) and carry predictive utility above age, gender, positive affect, and the Big Five in estimating dispositional sense of purpose (Ratner & Burrow, 2018). As purpose is an aspect of psychosocial development, understanding how diversity in sociocognitive functioning—like that which is afforded by including autistic traits in our discussion—could enable us to better understand the gradations of purpose's benefits. This will hopefully motivate work that helps a broader range of youth enhance their psychological and subjective well-being.

Research concerning structured youth activities and autism tends to focus on programs specifically designed for those with clinical diagnoses. For example, vocational exploration programs, which give autistic youth autonomy and support their interests within a set programmatic structure, demonstrate social and occupational skill development benefits (Dunn et al., 2015). Among studies focusing on the inclusion of autistic youth in out-of-school time programs (e.g., Fennick & Royle, 2003; Orr et al., 2021), psychological and relational outcomes are positive. Still, far less research asks how an individual difference like autistic traits may relate to processes that unfold within the context of youth programming. Programs that provide youth with a platform for exploring their passions autonomously and having positive relationships with adults are an interesting context for mapping such nuances. Indeed, many autistic people report "masking" or "social camouflaging" (i.e., acting in unnatural ways for the sake of fitting in; Attwood, 2006), and compelling anecdotal media reports of masking suggest that one's "true self" can be lost in the process (see Rakshit, 2021). Furthermore, despite difficulties with social relatedness potentially complicating cascades to subjective well-being through diminished authenticity (Thomaes et al., 2017), feigning social relatedness often comes at the cost of mental health (Cook et al., 2021; Hull et al., 2021). Therefore, programs that support purpose engagement—especially those that may allow youth to minimize masking through engaging with self-identified passions—may be among the best places to map the scope of daily purpose correlates.

While autistic traits tend to correspond with lower sense of purpose ratings at the between-person level (Ratner et al., 2020; Ratner & Burrow, 2018), autistic youth are still able to engage with the purposes they find in meaningful ways (Quinn et al., 2019) and derive subjective well-being from perceived societal contributions (Deserno et al., 2017) that often stem one's

overall purpose (Damon et al., 2003; Liang et al., 2017). Still, there may be reasons to wonder if daily purpose offers the same benefits to those with higher levels of autistic traits. Emotional self-awareness tends to be diminished among those with clinical autism (Huggins et al., 2021) and pleasure experiences, particularly those social in nature, tend to be subdued among college students with more autistic traits (Novacek et al., 2016). Furthermore, there is mixed evidence regarding the association between subclinical autistic traits and emotional reactivity: although autistic traits tend to predict greater emotional reactivity (Pisula et al., 2015), some studies have suggested more muted emotional responses to positive stimuli (Gayle et al., 2012) and generalized emotion regulation difficulties (Zhao et al., 2020). This calls for research to better understand for whom sensing daily purpose is beneficial.

The Current Study

This study contributes to the broader literature on the association between psychological and subjective well-being in adolescence in three key ways. First, in contrast to previous studies using short-term (c.f., 14-day; Kiang, 2012) designs, we surveyed youth for approximately 70 days to study how adolescent purpose predicts subjective well-being at both the dispositional (between-person) and daily (within-person) levels. To our knowledge, this study represents one of the longest daily diary assessments of these constructs among adolescents to date. In addition to disambiguating between- and within-person influences appropriately, this extended period of study will lend insight into the robustness of the association between adolescent purpose and subjective well-being. Second, we map these associations between purpose and subjective well-being as they occur within youth programming that may support developmental achievements. In a specialized context that affords daily opportunities to engage with purpose-salient activities, we may be able to see more clearly how purpose variability relates to subjective well-being. Finally,

we ask how the associations between daily purpose and subjective well-being occur across adolescents with varying levels of subclinical autistic traits, an individual difference that may hold particular relevance for the correlates of a psychosocial construct like purpose.

Based on the reviewed literature, we hypothesized that adolescents with greater dispositional purpose across the period of observation would experience greater daily subjective well-being compared to their peers. We further hypothesized that greater daily, within-person purpose above one's norm would offer additional benefits for daily subjective well-being. Finally, consistent with prior research on the relation between autistic traits, sense of purpose, and hedonic experiences (e.g., Novacek et al., 2016; Ratner & Burrow, 2018; Stimpson et al., 2021), we hypothesized that adolescents with greater autistic traits would experience lower levels of daily subjective well-being. However, as this study is the first investigation of how autistic traits may shape the subjective well-being correlates of sensing purpose, we made no hypotheses about the role of autistic traits on the association between daily purpose and subjective well-being.

Method

Participants, Setting, and Procedure

Participants were 204 adolescents ranging from 14 to 19-years-old (M_{age} = 16.42 years; SD_{age} = 1.18 years). In terms of gender identity, participants identified as female (70.1%), male (25.0%), a gender minority group (transgender male: 1.0%, gender-variant or non-conforming: 2.5%, unlisted: 0.5%), or preferred not to answer (1.0%). In terms of racial-ethnic identity, participants identified as African American/Black (22.1%), Asian American/Asian (30.9%), Hispanic or Latinx (14.7%), Caucasian/White (18.6%), an unlisted racial-ethnic group (2.5%), or as multiple racial-ethnic groups (10.8%).

All participants were enrolled in *GripTape* (https://www.griptape.org), a U.S.-nationwide nonprofit organization that aims to imbue youth learning with agency. The program invites applicants (i.e., "Challengers") to submit a proposal describing a topic they are passionate about pursuing, but may be unable to engage with due to resource constraints. Topics are unrestricted and range in content (e.g., starting a bakery, learning a new language, researching higher education resources for undocumented teens). Accepted applicants embark on self-driven "Learning Challenges" that last approximately 10 weeks. Challengers are given a maximum 500.00 USD grant and an adult mentor from the program (a "Champion," for whom expertise on the topic is not required) to support the youth's Learning Challenge. Thus, the *GripTape* program provides a unique context for studying the effects of daily purposefulness, as it is an environment that may enable youth purpose development (e.g., by providing supportive people, a space to pursue passions, and the resources for making these pursuits feasible; Burrow et al., 2021; Liang et al., 2017). The Challengers participating in this study had Learning Challenge lengths ranging from 30 to 125 days, with a mean length of 70.90 days ($SD_{Challenge\ Length}$ = 16.63). Most Challengers participated in the Learning Challenge for at least 70.0 days (50th percentile), with 19 Challengers completing their Learning Challenge in fewer than 51.4 days (10th percentile) and 24 Challengers needing more than 94.6 days (90th percentile).

The [REDACTED] Institutional Review Board approved this study before participant contact (Protocol #: 2011009919, "Tracking Changes in the Challengers of GripTape"). To participate in the study, Challengers and their guardians (if under the age of 18 years) completed *GripTape* intake paperwork and opted-in to receiving more information about a [REDACTED UNIVERSITY]-sponsored research study. Those interested in the opportunity received formal research consent documents. If guardian or adult consent was obtained, prior to meeting with

their Champion for the first time (i.e., the "Orientation Call"), participants completed a pre-Challenge survey to index baseline characteristics (e.g., self and personality, emotion and motivation, learning orientations, wellness, and relationships). A daily survey was administered to participants at 18:00 (local time) on each day of their Learning Challenge (i.e., from their "Orientation Call" to their "End-of-Challenge" call with their Champion). Participants received 5.00 USD for submitting the pre-Challenge survey and 0.50 USD for every submitted daily survey. As an additional form of compensation, participants had the option of receiving a "Research Summary" at the end of their Learning Challenge. This Research Summary was a report that visualized and explained their personal data for three variables assessed at the daily level across the Learning Challenge (n = 179). The pre-Challenge survey took participants approximately 30-45 minutes to complete and the daily survey took participants fewer than 5 minutes to complete. Both surveys contained more measures than those described below. In terms of compliance, the average participant responded to 55% of their daily surveys ($SD_{Compliance}$ = 30%). The only person excluded from the dataset was an individual participating in an experimental *GripTape* paradigm known as a "dual-Challenger" model, where two Challengers co-met with the same Champion throughout their Learning Challenges. As this model does not reflect our goals of assessing associations within the context of a normative Learning Challenge, this person's daily data were excluded prior to analysis.

Measures

Daily Assessments

A "Day" value was deposited into our embedded data on each day the participant returned to the survey. This variable automatically incremented to match the given participant's day of enrollment in the *GripTape* program, meaning, participants with longer Learning

Challenges necessarily received higher Day values across the study. This Day variable was rescaled to *Week* prior to analysis by dividing its value by seven. Rescaling facilitated model convergence by putting this index of time onto a numeric scale that was more similar to the five-point Likert scales used to assess other variables in the model (see below). Week was controlled across all analyses to de-trend the data for natural growth in the target subjective well-being variable across the program and avoid potential issues that conflate time in the program with the associations under study.

All substantive daily assessments asked participants to respond using a five-point Likert scale. *Daily sense of purpose* was indexed by a single item asking, "How purposeful do you feel today?" (Hill et al., 2021, 2022). Consistent with Whole Trait Theory, which suggests that traits can be represented by state-level density distributions (e.g., Fleeson, 2001), *dispositional purpose* was a variable created by taking the average of daily sense of purpose assessments. *Daily purpose,* as described in more detail below, was created by subtracting the participant's observed daily purpose value from their average level of purpose across the study. Daily purpose therefore indicates a deviation from dispositional purpose, informing us of when the participant was feeling more or less purposeful than was usual for them.

Daily subjective well-being was approximated by three variables: daily life satisfaction, daily positive affect, and daily negative affect (Diener, 1984). *Daily life satisfaction* relied on a slightly modified single-item assessment developed by Cheung and Lucas (2014): "All things considered, how satisfied do you feel with your life today?" In contrast to daily life satisfaction, *daily positive and negative affect* were both assessed with four items derived from momentary affect scales used by Kashdan and Farmer (2014). Participants were asked to rate "how much [they] felt the following emotions today" for positive (*content*, *relaxed*, *enthusiastic*, and *joyful*)

and negative (*anxious*, *angry*, *sluggish*, and *sad*) affect separately. We then took the average of the four positive and four negative affect items to create composite positive and negative affect scores for each person on each day. Because of their multi-item and multilevel nature, we can estimate reliability of between-person means (trait) and within-person deviations (states) over the observed timeframe with a multilevel confirmatory factor analytic approach (Lai, 2021). Overall composite (α^{2l}), between-level composite (α^{b}), and within-level composite (α^{w}) reliability were estimated to be .88 (95% CI [.86, .90]), .89 (95% CI [.86, .91]), and .81 (95% CI [.79, .83]) for positive affect and .74 (95% CI [.70, .78]), .80 (95% CI [.74, .84]), and .63 (95% CI [.58, .66]) for negative affect, respectively.

Subclinical Autistic Traits

Individual differences in autistic traits were assessed pre-Challenge with the 28-item Autism-Spectrum Quotient – Short (Hoekstra et al., 2011). Participants were asked the extent to which they agreed with each item on a scale from (1) *Definitely agree* to (4) *Definitely disagree*, with higher scores indicating a greater number of autistic traits. Items belong to five subscales (in this case, all examples are reverse-scored): social skills (7 items; e.g., "I find it hard to make new friends"), preference for routine (4 items; e.g., "I prefer to do things the same way over and over again"), difficulties with attention switching (4 items; e.g., "I frequently get strongly absorbed in one thing"), problems with imagination (8 items; e.g., "Reading a story, I find it difficult to work out the character's intentions"), and fascination with numbers/patterns (5 items, e.g., "I notice patterns in things all of the time"). We used a total autistic traits score created by averaging all scale items. Cronbach's α for the full scale was acceptable, .70 (95% CI [.65, .76]). Worth noting, the distribution of autistic traits in this sample (see Table 1 below) approximated scaled sum scores reported in other non-clinical control samples (Hoekstra et al., 2011).

Analytic Plan

Our aims were investigated using two-level multilevel modeling. With two-level multilevel modeling, we account for repeated, daily measures (Level 1) being nested within people (Level 2). Person-level predictors assumed to remain static across days of the study, like individual differences in autistic traits, are also situated at Level 2. Prior to analysis, all Level 1 predictors except *Week* were person-mean centered (to reflect within-person deviations from the individual's norm) and all Level 2 predictors were grand-mean centered (to reflect between-person deviations from the sample average). In doing so, and including these terms in the model, we disambiguate between- and within-person effects at the level of the predictor (Bolger & Laurenceau, 2013). All models used Restricted Maximum Likelihood estimation.

To test study hypotheses regarding how daily purpose predicts daily subjective well-being (referred to hereafter as tests nested under the title, "Model 1"), three models predicting life satisfaction, positive affect, and negative affect were constructed with the following formula:

Level 1:

$$Y_{ij}\,(Subjective\ Wellbeing) = \beta_{0j} + \beta_{1j}\,(Purpose_{\,ij} - \overline{Purpose}_{\bullet j}) + \beta_2\,(Week) + \varepsilon_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\overline{Purpose}_{\bullet j} - \overline{Purpose}_{\bullet\bullet}) + \mu_{0j}$$
$$\beta_{1j} = \gamma_{10} + \mu_{1j}$$
$$\beta_{2j} = \gamma_{20} + \mu_{2j}$$

At Level 1, each individual's ($_j$) subjective well-being on any given day ($_i$) was estimated as a function of their intercept (β_{0j}), daily deviations from their average purpose score across the study (*daily purpose*; β_{1j}), linear growth in the target subjective well-being variable over time (*Week*; β_2), and residual variance (ε_{ij}). At Level 2, the Level 1 intercept of daily subjective well-being (β_{0j}) was modeled using the sample average intercept (γ_{00}), slope for between-person

differences in average purpose across the study (*dispositional purpose*; γ_{01}), and random effects (μ_{0j}). Similarly, at Level 2, the Level 1 term for the effect of daily purpose (β_{1j}) was modeled as a fixed effect (γ_{10}) representing within-person deviations in daily purpose plus random effects (μ_{1j}). Finally, at Level 2, the Level 1 term for time across the study (β_{2j}) was modeled as a fixed effect (γ_{20}) representing change in subjective well-being over time plus random effects (μ_{2j}).

To test a cross-level interaction to examine the effect of autistic traits on the association between daily purpose and same-day subjective well-being (referred to hereafter as tests nested under the title, "Model 2"), our formula from above was expanded to include grand mean-centered autistic traits and the interaction between grand mean-centered autistic traits and within-person fluctuations in daily purpose:

Level 1:

$$Y_{ij}\,(Subjective\ Wellbeing) = \beta_{0j} + \beta_{1j}\,(Purpose_{ij} - \overline{Purpose}_{\bullet j}) + \beta_{2j}\,(Week) + \varepsilon_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\overline{Purpose}_{\bullet j} - \overline{Purpose}_{\bullet\bullet}) + \gamma_{02}\,(Autistic\ Traits_{j} - \overline{Autistic\ Traits}) + \mu_{0j}$$
$$\beta_{1j} = \gamma_{10} + \gamma_{11}\,(Autistic\ Traits_{j} - \overline{Autistic\ Traits}) + \mu_{1j}$$
$$\beta_{2j} = \gamma_{20} + \mu_{2j}$$

At Level 1, each individual's ($_j$) subjective well-being on any given day ($_i$) was estimated as a function of their intercept (β_{0j}), daily deviations from their average purpose score (*daily purpose*; β_{1j}), linear growth in the subjective well-being variable over time (*Week*; β_2), and residual variance (ε_{ij}). At Level 2, the Level 1 intercept of the daily subjective well-being variable was modeled using the sample average intercept (γ_{00}), slopes for between-person differences in average purpose across the study (*dispositional purpose*; γ_{01}) and between-person differences in autistic traits at baseline (γ_{02}), plus random effects (μ_{0j}). Also at Level 2, the Level 1 term for the effect of daily purpose (β_{1j}) was modeled as a fixed effect (γ_{10}), plus a fixed effect

for its cross-level interaction with autistic traits (γ_{11}) and random effects (μ_{1j}) that permitted variation by subject. Finally, the Level 1 term for time (β_{2j}) was modeled at Level 2 as a simple fixed effect (γ_{20}), plus random effects (μ_{2j}).

All analyses were conducted in R Studio (R Version 4.2.1). The *psych* package (Revelle, 2018) yielded all descriptive statistics, intraclass correlations, between-person correlations, and within-person correlations. Multilevel models were conducted with the *lme4* package (Bates et al., 2015), which is programmed with several useful default behaviors, including the estimation of random effect correlations. Models were built to be maximally informative and, to further aid model convergence, the popular *BOBYQA* optimizer was used (Brown, 2021). Missing observations were excluded from analysis, meaning, results are based on available cases only. Finally, effect sizes were calculated using the *performance* package (Lüdecke et al., 2021). These calculations are based on established formulas for a partitioned R^2 for mixed effects models (Nakagawa et al., 2017): conditional R^2 refers to the explained variance of both fixed and random effects. Marginal refers R^2 to only the explained variance of the fixed effects.

Results

Table 1 displays the descriptive statistics, intraclass correlations (ICC; bolded diagonal), between-person correlations (below diagonal), and within-person correlations (above diagonal) among all study variables. In general, all subjective well-being variables positively corresponded with one another, and purpose positively corresponded with all subjective well-being variables. This was true at both the between- and within-person levels of correlation. At the between-person level, autistic traits were negatively correlated with both purpose and the individual facets of subjective well-being. Importantly, according to ICC estimates, only about half of the variance in daily life satisfaction (44%), daily positive affect (53%), and daily negative affect (52%)

scores were attributable to between-person differences. Thus, multilevel modeling was appropriate for locating information about remaining within-person sources of variance.

Table 1. *Descriptive Statistics, intraclass correlations, between-person correlations, and within-person correlations of study variables.*

	M	*SD*	(1)	(2)	(3)	(4)
(1) Daily purpose	3.28	1.14	**.39**	.53	.40	-.25
(2) Daily life satisfaction	3.59	1.05	.79	**.44**	.51	-.36
(3) Daily positive affect	3.08	1.02	.76	.73	**.53**	-.40
(4) Daily negative affect	1.99	0.85	-.41	-.63	-.44	**.52**
(5) Autistic traits	2.36	0.27	-.31	-.33	-.38	.32

Notes: All bivariate associations significant at $p \leq .001$. Between-person correlations = below diagonal, within-person correlations = above diagonal, bolded diagonal = ICC for the daily variable's null model.

Daily Purpose and Daily Subjective Well-being

The results of all multilevel models examining the prediction of daily subjective well-being from same-day fluctuations in sense of purpose, above and beyond individual differences in dispositional purpose, are presented in Table 2 (Model 1). While we failed to find evidence suggesting linear change in any subjective well-being variable across the study, across all three models, between-person differences in dispositional purpose corresponded with greater daily subjective well-being. As such, relative to others in the sample, individuals who tended to score highly on purpose across the study were more likely to report greater life satisfaction and positive affect, and lower negative affect, from day to day. Furthermore, daily purpose—our within-person coefficient representing the daily deviation of one's purpose score from their overall dispositional score—corresponded with greater daily subjective well-being. Said differently, on days that youth felt more purposeful than usual, we could expect greater daily life satisfaction and positive affect, and lower negative affect.

The combination of fixed effects (marginal R^2) accounted for 42%, 35%, and 10% of the explained variance in daily life satisfaction, positive affect, and negative affect, respectively. There was some variability in participants' daily subjective well-being starting values (*SD*s = .44-.53) and their within-person daily purpose effects (*SD*s = .13-.19) across models. Subjective well-being intercepts also seemed to trend negatively with the week and within-person daily purpose effects across the study. In other words, youth who began the study with greater levels of subjective well-being tended to exhibit smaller daily purpose coefficients, and the smallest amount of change in subjective well-being, across the study.

Daily Purpose and Daily Subjective Well-being: Tests of Moderation by Autistic Traits

Finally, we explored whether individual differences in autistic traits moderated the association between daily purpose and subjective well-being. All models testing this question are presented in Table 2 (Model 2). All significant Model 1 fixed effects remained significant when the between-person effect of autistic traits and the cross-level interaction of autistic traits with daily purpose were added to the model. In addition to both dispositional and daily purpose positively predicting greater daily subjective well-being, the fixed effect for between-person differences in autistic traits demonstrated a negative association with daily subjective well-being. In other words, individuals with greater autistic traits relative to others in the sample tended to report lower life satisfaction, lower positive affect, and greater negative affect from day to day. In the critical test of the cross-level interaction between autistic traits and daily purpose, we failed to find evidence that autistic traits moderated the daily subjective well-being correlates of feeling more purposeful than usual.

With the addition of between-person differences in autistic traits and the cross-level interaction between autistic traits and daily purpose, fixed effects accounted for 43%, 37%, and

21% of the explained variance in daily life satisfaction, positive affect, and negative affect scores, respectively. As observed in the Model 1 series, there was variability in participants' daily subjective well-being intercepts (*SD*s = .41-.52) and their within-person daily purpose effects (*SD*s = .13-.19). The negatively-trending correlations between subjective well-being intercept, week, and daily purpose random effects remained in the expanded model with autistic traits: youth with who began the study with greater subjective well-being tended to have weaker associations between daily purposefulness and daily subjective well-being, and exhibit less overall change in subjective well-being, across the study.

Table 2. *Multilevel models predicting daily subjective well-being from daily purpose (Model 1) and autistic traits (Model 2)*

	Life Satisfaction		Positive Affect		Negative Affect	
	Model 1 *B (SE)* 95% CI	**Model 2** *B (SE)* 95% CI	**Model 1** *B (SE)* 95% CI	**Model 2** *B (SE)* 95% CI	**Model 1** *B (SE)* 95% CI	**Model 2** *B (SE)* 95% CI
Fixed Effects						
Week	-.0005 (.005) [-.01, .01]	-.00008 (.005) [-.01, .01]	-.01 (.005) [-.02, .002]	-.01 (.005) [-.02, -.002]	.006 (.006) [-.01, .02]	.006 (.006) [-.01, .02]
Dispositional Purpose	.74 (.04)*** [.66, .82]	.70 (.04)*** [.62, .78]	.73 (.05)*** [.65, .82]	.67 (.05)*** [.58, .76]	-.31 (.05)*** [-.42, -.21]	-.26 (.05)*** [-.37, -.16]
Daily Purpose	.46 (.02)*** [.42, .49]	.46 (.02)*** [.42, .49]	.31 (.02)*** [.28, .35]	.31 (.02)*** [.28, .34]	-.15 (.01)*** [-.18, -.13]	-.15 (.01)*** [-.18, -.13]
Autistic Traits		-.34 (.12)** [-.57, -.11]		-.54 (.12)*** [-.78, -.30]		.44 (.14)** [.16, .72]
Autistic Traits X Daily Purpose		.07 (.06) [-.06, .19]		.08 (.06) [-.04, .19]		-.06 (.05) [-.15, .03]
Conditional R^2	.62	.62	.64	.64	.61	.61
Marginal R^2	.42	.43	.35	.37	.10	.12
Random Effects (RE)	***SD***		***SD***		***SD***	
Intercept	.44	.43	.44	.41	.53	.52
Daily Purpose	.19	.19	.17	.17	.13	.13
Week	.04	.04	.05	.05	.06	.06
Residual	.64	.64	.61	.61	.53	.53
	RE Correlation		**RE Correlation**		**RE Correlation**	
Daily Purpose-Week	.00	.00	.04	.04	-.07	-.06
Intercept-Week	-.32	-.33	-.03	-.03	-.15	-.16
Intercept-Daily Purpose	-.45	-.44	-.12	-.09	-.17	-.15

Notes: * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Discussion

In this study, we used one of the most intensive assessments of subjective well-being and sense of purpose to date (approximately 70 days) to better understand how these forces interface within youth on a day-to-day basis. We further studied these processes within the context of *GripTape*, a program with several features that may support youths' daily purpose engagement (Burrow et al., 2021; Hill et al., 2013; Liang et al., 2017). Finally, we questioned whether any observed benefits of sensing purpose at the daily level extend across youth with varying subclinical levels of autistic traits.

First, above and beyond nonsignificant change in subjective well-being across the study, both between-person differences in dispositional purpose and within-person daily purpose positively predicted daily life satisfaction and positive affect, and negatively predicted daily negative affect. These findings support our first set of study hypotheses regarding purpose and subjective well-being. Consistent with prior research on adults (e.g., Pfund et al., 2021; Sumner et al., 2015), our findings for dispositional purpose suggest that adolescents who reported greater average purpose also tended to report greater daily subjective well-being than their peers. Also, consistent with research on the daily benefits of purposefulness among adults (e.g., Hill et al., 2021) and Asian American adolescents (Kiang, 2012), our findings for daily purpose show that when adolescents felt more purposeful *than was usual for them*, they tended to experience greater levels of daily subjective well-being. The disambiguation of between- and within-person sources of variance for purpose in our analyses shows the unique benefits of dispositional and daily purpose with greater clarity than past work. These findings bolster our confidence about the theoretical connection between psychological and subjective well-being (Chen et al., 2013; Joshanloo, 2019; Ryan & Deci, 2001), and extend that confidence to the microlevel of

experience, with more daily information than previously known. Situating these results within broader literature, Fredrickson's (2001) Broaden and Build Theory of positive emotions can aid our understanding of why dispositional and daily purpose might relate to teens' greater daily subjective well-being. Positive emotions and personal resources (e.g., mindfulness skills, sensed purpose in life, increased social support) appear reciprocally related in upward spirals of flourishing (Fredrickson et al., 2008; Fredrickson & Cohn, 2008; Fredrickson & Joiner, 2002): when people feel positively, they tend to engage in exploratory behaviors that expand physical, social, and internal resources and increase the likelihood of future positive affect. Our work showing that both dispositional and daily purpose relate to greater daily subjective well-being sheds light on part of this process in a finer-grained way than literature has afforded before. That said, establishing whether purposeful youth *actually* engage in correlated daily resource-building and positive affect-affording behaviors as a result of feeling more purposeful than usual will be up to future research.

Of course, in addition to exploring mechanisms of the observed purpose/subjective well-being associations, it would be ideal for future work to find ways to increase dispositional purpose. Speaking in terms of the bivariate relation, the literature suggests that those with a greater sense of overall purpose tend to enjoy more benefits across the board (for review, see Pfund & Hill, 2018), and our study corroborates this notion by showing that heightened subjective well-being was most strongly associated with between-person differences in dispositional purpose. However, trait-like constructs are, by their very nature, relatively stable across time and situations. Nevertheless, this study can serve as motivation for future interventions that aim to increase one's capacity to sense more daily purpose than usual, regardless of where that person stands relative to others in terms of disposition. The literature in

this domain is promising: purpose writing interventions among adults that ostensibly operate at a similar "state-level" have demonstrated emotional benefits such as short-term affective stabilization (e.g., Burrow & Hill, 2013; Burrow & Rainone, 2017). Moreover, natural extensions of this question are (a) whether interventions that successfully promote consistent "state" purpose upticks eventually result in "trait" purpose increases (see Hill et al., in press) among adolescents and (b) whether these "trait" increases stand to increase global assessments of subjective well-being. Our finding that daily purpose is a unique predictor of daily subjective well-being beyond youths' rank-order differences in dispositional purpose enables this type of work to take place.

Second, aligning with study hypotheses and previous work on autistic traits, purpose, and hedonic experiences (e.g., Novacek et al., 2016; Ratner & Burrow, 2018; Stimpson et al., 2021), we found that individuals with more autistic traits at baseline tended to experience lower daily subjective well-being across the study. Although our data are unable to speak to mechanisms driving this association, potential reasons for the observed negative correlation include (a) greater emotion regulation difficulties among those with clinical ASD and elevated autistic traits (e.g., Cibralic et al., 2019; Zhao et al., 2020) and (b) decreased perceived social skills that may increase social anxiety (Liew et al., 2015) and therefore limit opportunities for reaping subjective well-being through social connectedness, expansion, and interaction (Bailey et al., 2020; Deserno et al., 2017; Fredrickson, 2001; Fredrickson et al., 2008). Importantly, when it came to the question of whether the strength of the association between daily purpose and subjective well-being varied across level of autistic traits, we failed to find evidence of moderation. Although we must take care in interpreting null effects, this pattern of evidence suggests that when youth are able to experience greater purpose than is usual for them, we should expect

commensurate benefits for daily subjective well-being that persist across different levels of autistic traits. Thus, beyond rank-order differences in sensing purpose, when youth can sense purpose at a rate that is higher than normal for them, those with higher levels of autistic traits seem to be able to secure subjective well-being benefits in an amount on-par with the benefits experienced by those with fewer autistic traits.

Like above, the question emerges: how do we support those with higher levels of autistic traits feel more purposeful day to day? Indeed, when purpose content can be articulated, clinically autistic youth are able to engage with activities consistent with that purpose (Quinn et al., 2019). Although severity may play a role, there is therefore no question of whether purpose development within autistic youth—or youth with high autistic traits—is possible. Furthermore, purpose often occurs alongside some desire to have an impact on the world beyond the self (e.g., Damon et al., 2003; Liang et al., 2017) and autistic youth making societal contributions seem to achieve greater subjective well-being (Deserno et al., 2017). Previous studies examining the relation between subclinical autistic traits and purpose have shown that communication difficulties tend to carry the most unique explanatory power (Ratner & Burrow, 2018), and the social learning pathway to purpose (i.e., construction of purpose after purposeful role models; Hill et al., 2014) is the only purpose pathway inconsistently related to autistic traits (Ratner et al., 2020). Future interventions looking to support psychosocial development among a more inclusive range of youth neurodiversity may turn to these targets. For example, do purpose writing interventions (e.g., Burrow et al., 2018; Burrow & Rainone, 2017) allow youth across the spectrum of autistic traits to engage with their purpose enough to claim its benefits? Writing may circumvent issues related to communication. Similarly, could *GripTape*'s experimental "dual-Challenger" model (mentioned in our study Method as an aberrant case) be more viable for

autistic youths' purpose engagement because the presence of a co-Challenger affords opportunities for engaging with the social learning purpose pathway? Our study, demonstrating that daily purpose benefits are not only possible for youth high in autistic traits, but commensurate with the daily purpose benefits observed among those low in autistic traits, will open the door for studying these questions with future work.

Constraints on Generality and other Limitations

Consistent with calls for greater attention to the spaces where certain effects unfold, discussing our target population explicitly may enable future replication of, and sensitivity tests for, the present work (Simons et al., 2017). The *GripTape* program is replete with features linked to purpose development in prior literature (e.g., Burrow et al., 2021; Hill et al., 2013; Liang et al., 2017). While the actual purpose-supporting properties of *GripTape* await investigation, the youth in this study were in an ideal situation for avoiding constraints like social camouflaging (e.g., Cook et al., 2021) and engaging with purpose-salient activities on a day-to-day basis. Because this likely lends itself to greater purpose variability and associated advantages, the effects observed may not generalize to everyday life of the average adolescent. Furthermore, perhaps reflecting *GripTape*'s preference to serve youth who lack the opportunities and resources to pursue their passions (GripTape, 2022) and girls' propensities to outperform boys in verbal tasks that may facilitate a competitive application (Hirnstein et al., 2022), our sample was nonrepresentative of American teens both in terms of racial-ethnic composition and gender distribution. While the results of this study align with prior research on daily purposefulness with participants outside of a supportive program (e.g., Hill et al., 2021; Kiang, 2012; Pfund et al., 2021), some may wish to replicate this study in a more representative sample of the general population to establish robustness of the observed effects. This is especially true for the findings

on autistic traits, as clinical autism and autistic traits tend to be more common among males (Fombonne, 1999; Hoekstra et al., 2011). A predominantly female sample may limit our ability to see the full scope of autistic trait correlates.

A second set of potential limitations concern related issues of methodology. First, while the subjective nature of many of our variables is—arguably—only accessible via self-report, using a single method of assessment leaves our results vulnerable to inflation through common method bias (e.g., Podsakoff et al., 2003). Diversifying forms of assessment in the future, like obtaining parent reports of a child's autistic traits (Johnson et al., 2009), could contribute to a more holistic view of the results. Next, single-item assessments are growing in use due to new insights into their empirical value (e.g., Matthews et al., 2022) and their practical utility in intensive longitudinal assessment. Indeed, shorter questionnaires appear to decrease participant burden and increase response quantity and quality (Eisele et al., 2022). With an average of 70 survey requests per participant, user experience became among our primary concerns during study design and conceptualization. While the single-item assessments we used in this study had been employed in prior research (Cheung & Lucas, 2014; Hill et al., 2021, 2022), and other research has successfully used single-item assessments of purpose and life satisfaction with adolescents (Jovanović, 2016; Kiang, 2012; Orben et al., 2022), some may continue to question these items' psychometric properties. Future work may wish to study the robustness of our measures, and across a more diverse range of samples, to understand the contours of their validity.

A few additional issues arise when considering the study's compliance and sampling, but these blind spots create interesting avenues for follow-up investigation. First, our average survey compliance rate was somewhat low (55%). Although our study surveyed youth for much longer

than the typical daily diary design, this rate falls short of similar intensive daily diary designs with adolescents in medical research (68% average compliance; Heyer & Rose, 2015). In addition to finding ways to adequately control for the bias that might be introduced by selective responding and missingness (e.g., Little & Rubin, 1989), future work in this domain may wish to explore compliance predictors, ways to increase compliance, and the observed associations under more optimal responding conditions. Second, our estimates suggest that we were adequately powered to detect main effects (daily purpose, dispositional purpose, autistic traits) roughly the same size or smaller than those observed here. Interactive effects are historically difficult to power adequately (e.g., Gelman, 2018) and, while we should have been able to detect a medium-sized focal interactive effect if one existed, it remains possible that we simply did not have enough power to detect a smaller effect. Although smaller interactive effects may have more limited practical significance, it will be up to future research to explore this possibility. Finally, the level of autistic traits in this sample was consistent with other control samples (Hoekstra et al., 2011), but future work may wish to compare subclinical and ASD-diagnosed youth samples. Although it is appropriate to think about autistic traits on a spectrum of severity with ASD diagnoses at the extreme end of the distribution (Ruzich et al., 2015), incorporating those with clinical diagnoses into a future study may help us better understand how associations between daily purpose and subjective well-being exist across the full range of diagnostic severity.

A final limitation to consider is how adolescents understood the term “purposeful,” in our daily assessments. In addition to evidence that feeling purposeful is a common teen experience (for review, see Hill & Burrow, 2021), youth as young as 13 years have been shown to answer questions about purpose in life thoughtfully (see, for example, Linver et al., 2018). Furthermore, our specific purpose item has been used among college students successfully (Hill et al., 2022),

and qualitative investigations have failed to show significant differences between teen and emerging adult thematic conceptualizations of purpose (Ratner et al., 2021). Quantitative data on whether teens feel "purposeful" from day to day is a novel contribution of the present study, but it would be wise for future work to investigate the best ways to assess purpose among young people with brief measures. Although it remains an open empirical question, the current evidence we are aware of gives us little reason to believe that a mid-to-late adolescent sample would struggle with the semantics of our daily purpose item.

Conclusion

Using one of the most intensive examinations of youth purpose to date, this study further cements the beneficial role of feeling purposeful for adolescents' daily subjective well-being. Beyond showing that more purposeful adolescents tend to feel greater subjective well-being from day to day, we were able to demonstrate the unique value of feeling more purposeful *than is usual* for the prediction of daily subjective well-being. Representing a "state-like" construct, the practical implications of this research include inspiration to use daily purposefulness as a target for future subjective well-being interventions. These interventions may ultimately create inroads for dispositional change (e.g., Allemand & Flückiger, 2017; Hill et al., in press). Furthermore, we failed to find evidence that the benefits associated with feeling more purposeful than usual are constrained to those with lower autistic traits. Although it will be up to future experimental work to examine, this finding suggests that the daily purpose interventions suggested above may stand to benefit a neurodiverse range of youth. With the groundwork laid by this study, helping teens feel greater daily purpose emerges as a viable route to securing greater daily subjective well-being for many young people.

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