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BRIEF REPORT

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Digital location tracking in the parent/caregiver–college student dyad

Gregory E. Chase[1] | Morgan T. Brown[1] | Jessica L. Navarro[2] | Melissa A. Lippold[3] | Michaeline Jensen[1]

[1]Department of Psychology, University of North Carolina at Greensboro, Greensboro, North Carolina, USA

[2]Human Service Studies, Elon University, Elon, North Carolina, USA

[3]School of Social Work, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

Correspondence

Gregory E. Chase, Department of Psychology, University of North Carolina at Greensboro, 296 Eberhart Bldg PO Box 26170, Greensboro, NC 27402-6170, USA.
Email: gechase@uncg.edu

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Abstract

Introduction: As college students navigate new developmental milestones, many families rely on digital technology to stay connected and aid in the transition to adulthood. Digital location tracking apps allow for parental monitoring in new ways that may have implications for youth development. Although recent research has begun to examine prevalence and motivations for digital location tracking in adolescence, we know little about how and why families continue to track into the transition to college, and how this may relate to perceptions of helicopter and autonomy supportive parenting.

Methods: In a cross-sectional study of 706 community college and 4-year university students in the Southeastern United States, we describe prevalence and socio-demographic differences in parent/caregiver digital location tracking of their college student children, and how this may be associated with perceptions of helicopter parenting and parent/caregiver autonomy support.

Results: Findings suggest that digital location tracking is a fairly common practice among college students, with nearly half of the sample endorsing currently or previously being digitally location tracked by their parent/caregiver. Younger, White, and higher socioeconomic status students were more likely to be tracked. Those students who were currently being digitally location tracked tended to perceive their primary parent/caregiver as engaging in more helicopter parenting and as less supportive of their autonomy.

Conclusions: This brief report provides preliminary insight into parent/caregiver digital location tracking of their college student children. It is our hope that future research will further examine how digital location tracking may be helping or hindering attainment of developmental milestones in the digital age.

KEYWORDS

autonomy, college students, digital location tracking, parental monitoring

1 | INTRODUCTION

As adolescents enter young adulthood, they navigate developmental tensions between their desire to gain autonomy from and maintain connections with parents (Arnett, 2000; Deci & Ryan, 2000; Gomez & McLaren, 2006). Balancing autonomy and family relatedness can become challenging amidst new transitions, including leaving the family home to begin college (Soenens et al., 2007), although expectations around autonomy also shift for youth who continue to reside in their family's home (Kins et al., 2009).

Scholars have expressed concern that secular trends over the decades towards more parental involvement in their adult children's lives (Fingerman, 2017) are evidence of excessive parental involvement in the form of "overparenting" or

"helicopter parenting" (Segrin et al., 2013). Indeed, more helicopter parenting is linked to poorer college student adjustment (Kwon et al., 2016) and can be problematic in that it violates young adults' basic psychological need for autonomy (Deci & Ryan, 2000; Schiffrin et al., 2014) and thwart a successful transition to college (Darlow et al., 2017; Klein & Pierce, 2009). Consistent with a stage-environment fit perspective (Eccles et al., 1993), parental monitoring ought to decrease with age as independence and self-reliance increase (Padilla-Walker & Nelson, 2019), but the majority of youth today believe that their parents have authority to monitor their behavior in at least some aspects of their lives (Padilla-Walker et al., 2014). Understanding how youth navigate the tensions between increased independence and relatedness in the digital age is integral to future research and to supporting clinicians and educators working with families.

In the digital age, parents/caregivers have more tools at their disposal to monitor their children than ever before, such as digital location tracking apps (e.g., Life360 and Apple's Find My Friends) that use GPS technology to pinpoint a user's location. Digital location tracking apps are commonly marketed to families as a means to ensure safety and as a "necessary tool of responsible and loving parenting" (Marx & Steeves, 2010, p. 1477). Recent reports in the popular press have implied that the widespread use of digital location tracking during the college years may stunt autonomy development (Jargon, 2021; Jones, 2021), but empirical evidence around the influence of digital location tracking on development is nascent.

Recent research with adolescents and their parents (Burnell et al., 2023) found that about half of adolescents and parents reported digital location tracking, with female and younger adolescents more likely to be tracked. In another recent study, parents endorsed safety concerns as their primary motivation for tracking their children's location, although themes of coordination and convenience also emerged (Widmer & Albrechtslund, 2021). To strengthen our understanding of this novel phenomenon, additional evidence is needed about the prevalence of digital location tracking in college students, the motivations behind decisions to continue or discontinue digital location tracking, and student's perceptions of their parents/caregivers as "helicopter parents" or as being unsupportive of their budding autonomy as it relates to their engagement in digital location tracking.

1.1 | The current study

The present study seeks to fill these gaps. In a sample of 706 community college and 4-year university students recruited from the Southeastern United States, we: (a) examine the prevalence of digital location tracking of college students by parents/caregivers (and if this prevalence varied across sociodemographic groups or level of perceived parent/caregiver involvement), (b) describe the student-reported reasons that parents/caregivers and students engage in digital location tracking, and (c) test the hypotheses that students who have a parent/caregiver that utilizes digital location tracking will perceive their parent/caregiver as engaging in more helicopter parenting and being less supportive of their autonomy. We hypothesized that those students who see their parent/caregiver as more involved overall would be more likely to report that their parent/caregiver engages in digital location tracking. Given the novelty of this research, a priori hypotheses about sociodemographic differences in digital location tracking prevalence were limited, though based on the traditional parental monitoring literature we would expect that younger and female college students (Jacobson & Crockett, 2000; Mills et al., 2021) may be monitored at higher rates than older and male college students. We also hypothesized that college students of color might be digitally location tracked more often by their parents/caregivers than White students, as non-White parents/caregivers may value monitoring to ameliorate safety concerns (Jambunathan et al., 2000; Lansford et al., 2018; Sukk & Siibak, 2021).

2 | METHOD

2.1 | Sample and procedures

Community college and 4-year university students completed an Institutional Review Board-approved online survey via Qualtrics during the Fall 2021 semester and were compensated with psychology course credits. A total of 829 students consented to participate in the study. Students who were not between the ages of 18 and 25 years ($n = 31$) were excluded, as were an additional 92 participants due to data quality concerns (e.g., completing <20% of the survey, spending <15 min on the total survey). Students in the final analytic sample ($N = 706$) ranged in age from 18 to 25 years ($M_{age} = 19.07$, SD = 1.53). The majority of students identified as female ($n = 500$, 70.8%), 160 (22.7%) identified as male, and 29 (4.1%) identified as another gender identity (e.g., nonbinary). The sample was racially/ethnically diverse (34.2% White, not-Hispanic; 32.7% Black, not-Hispanic; 15.2% Hispanic/Latinx (of any race), 8.9% Asian, 3.3% American Indian/Alaskan Native, 1.7% Middle Eastern/North African, 1.0% another race/ethnicity, and 0.7% Native Hawaiian/other Pacific Islander).

2.2 | Measures

2.2.1 | Demographic variables

Students reported on key demographics including age, parent/caregiver education as a proxy for socioeconomic status (Whorton et al., 2021; 1 = *less than high school* to 6 = *graduate, medical, or professional school*; the student reported on both of parents/caregivers and the highest education attained was used for analysis; 33.3% had at least one parent/caregiver who had completed at least an undergraduate education), relationship to designated primary parent/caregiver (76.5% biological mother, 12.6% biological father), college attended (77.8% enrolled in 4-year university), who they live with (32.9% currently living with their parent/caregiver), gender identity (which was dummy coded into male [22.7%] and other [4.1%], with female [70.8%] serving as the reference group), and race/ethnicity (recoded into White [34.2%; reference], Black [32.7%], Latinx [15.2%], and Other [17.6%, including: Asian, American Indian/Alaskan Native, and so on, and biracial students due to small sample size of these groups]). Community college students were more likely to live with their parent/caregiver than 4-year university students ($\chi^2(1) = 121.65$, $p < .001$); however, there were no other significant differences on any of these demographic variables between community college and 4-year university students.

2.2.2 | Parental digital location tracking

Students answered a series of investigator-developed questions (Table 1) which asked whether their physical location was currently being tracked by their parent(s)/caregiver(s) (e.g., via GPS or Apple's Find my Friends; binary Yes/No). Those who

TABLE 1 Parent/caregiver digital location tracking questions.

Item wording	Response scale
Do your parent(s) or caregiver(s) currently track your physical location using GPS and/or an application on your smartphone (e.g., Apple's Find My Friends, Google Maps, Snapchat's Snap Map, or carrier-sponsored location tracking)?	1 = *Yes* 2 = *No*
[If currently tracked] Why do your parent(s) or caregiver(s) track your location?	1 = *Safety* 2 = *Convenience* 3 = *Control* 4 = *Other reason* _____
[If not currently tracked] Have your parent(s) or caregiver(s) ever tracked your physical location using GPS and/or an application to your smartphone (e.g., Apple's Find My Friends, Google Maps, Snapchat's Snap Map, or carrier-sponsored location tracking)?	1 = *Yes* 2 = *No* 3 = *Don't know*
[If previously tracked] Why did your parent(s) or caregiver(s) track your location?	1 = *Safety* 2 = *Convenience* 3 = *Control* 4 = *Other reason* _____
[If previously tracked] Why did they stop tracking your physical location?	1 = *My request* 2 = *Caregiver/parent decision* 3 = *Joint decision* 4 = *Other reason* _____
[If currently or previously tracked] At what age did your parent(s) or caregiver(s) stop tracking your location at all times?	1 = _____*Years*
Do you track your parent(s) or caregiver(s) using GPS and/or an application to your smartphone?	1 = *Yes* 2 = *No*
[If currently tracked] Why do you track your parent(s) or caregiver(s) physical location?	1 = *Safety* 2 = *Convenience* 3 = *Control* 4 = *Other reason* _____
[If not currently tracked] In the past, did you ever track the physical location of your parent(s) or caregiver(s) using GPS and/or an application on your smartphone?	1 = *Yes* 2 = *No*
[If previously tracked] Why did you track your parent(s) or caregiver(s) physical location?	1 = *Safety* 2 = *Convenience* 3 = *Control* 4 = *Other reason* _____

endorsed currently being tracked (36.1% of the sample) were asked to choose their parent(s)'/caregiver(s)' primary motivation: Safety, Convenience, Control, and Other with a write-in option (which were coded by the study team to ensure they were not better suited for one of the response options). Students who were not currently being digitally location tracked (64.0% of the sample) were asked if they had been digitally tracked by their parent(s)/caregiver(s) in the past (11.0% Yes), what they thought their parent(s)/caregiver(s)' primary motivation was (Safety, Convenience, Control, and Other with a write-in option), why their parent(s)/caregiver(s) stopped tracking their location (options of My Request, Caregiver/Parent Decision, Joint Decision, and Other with a write-in option), and at what age their parent(s)/caregiver(s) stopped tracking their location. Students also answered similar items on whether they had current (30.5%) or past (7.8%) access to the digital location of their parent(s)/caregiver(s), along with their primary motivation for digital location tracking their parent/caregiver.

2.2.3 | Perceptions of parenting

Students completed a measure of Helicopter Parenting (Schiffrin et al., 2014) about their "primary parent/caregiver." The helicopter parenting scale comprises nine items (e.g., "My primary caregiver/parent regularly wants me to call or text them to let them know where I am") with scores ranging from 1 (*Strongly disagree*) to 6 (*Strongly agree*). Mean scores were computed for the helicopter parenting ($M = 2.88$, SD = 0.99) scale, which evidenced adequate internal consistency ($\alpha = .79$).

Students completed the Involvement and Autonomy Support subscales of Perceptions of Parents Scales (Grolnick et al., 1991) for their "primary parent/caregiver." The involvement scale comprises six items (e.g., "My primary parent/caregiver puts time and energy into helping me") and the autonomy support subscale includes nine items (e.g., "My primary parent/caregiver helps me to choose my own direction") with scores ranging from 1 (*Not true at all*) to 7 (*Very true*). Mean scores were computed for the involvement ($M = 5.41$, SD = 1.33) and autonomy support ($M = 5.06$, SD = 1.32) subscales, which evidenced strong internal consistency ($\alpha = .87$ and .90, respectively). Helicopter parenting and autonomy support were significantly and inversely correlated ($r = -.12$, $p = .002$; see Table 2 for correlations between study variables).

2.3 | Analytic approach

We computed descriptive statistics for current/past/never digital location tracking of college students by parent(s)/caregiver(s), by college students of parent(s)/caregiver(s), and perceived motivations for digital location tracking. We also tested

TABLE 2 Correlations between study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	–														
2. Female gender	−.01	–													
3. Male gender	−.03	−.90**	–												
4. Other gender	.08*	−.34**	−.12**	–											
5. White race	.09*	−.09*	.06	.07	–										
6. Black race	−.07	−.06	−.04	−.06	−.51**	–									
7. Latinx race	−.02	>−.01	−.01	.03	−.31**	−.30**	–								
8. Other race	−.01	.03	−.04	−.04	−.33**	−.32**	−.19**	–							
9. Caregiver education	.01	−.01	.01	.01	.20**	.04	−.32**	<.01	–						
10. Parental involvement	−.04	−.03	.03	.03	−.05	.04	.03	>−.01	.07	–					
11. Never tracking	.10**	.04	−.06	−.06	−.17**	.16**	.02	.01	−.10**	−.14**	–				
12. Current tracking	−.16**	.02	−.04	.03	.16**	−.12**	−.02	−.04	.10*	.11**	−.76**	–			
13. Past tracking	.07*	−.05	.03	.03	.02	−.08	.01	.04	>−.01	.03	−.36**	−.25**	–		
14. Helicopter parenting	−.27**	.08*	−.03	−.03	−.22**	.07	.02	.16**	−.01	.09*	−.08*	.07	−0.01	–	
15. Autonomy support	.05	.01	.01	.01	.03	<.01	.03	−.06	.06	.78**	−.07	.03	.03	−.12*	–

*$p < .05$; **$p < .001$.

whether digital location tracking (current, past, and never) of students by parent(s)/caregiver(s) differed across sociodemographic categories and by level of parent/caregiver involvement using analysis of variance with Tukey's honest significant difference test for continuous variables and chi-square tests for categorical variables. Finally, we regressed student perceptions of helicopter parenting and autonomy supportive parenting by their primary parent/caregiver on parent(s)/caregiver(s) past and current tracking of their college student children (using never as our reference group) in separate models in Mplus 8.6 (Muthén & Muthén, 2021) using a maximum likelihood estimator with robust standard errors (MLR) and full information maximum likelihood for missing data handling ($n = 85$ missing on tracking variables; Enders & Bandalos, 2001). Key demographic variables were controlled for in analyses to account for potential links with perceptions of helicopter parenting and autonomy supportive parenting, consistent with previous work (Burnell et al., 2023): Gender, race/ethnicity, and caregiver education. Finally, to better determine unique associations with perceptions of helicopter parenting and autonomy supportive parenting above and beyond general parental involvement, we included parental involvement as a covariate to assess whether digital location tracking was uniquely associated with student perceptions of helicopter parenting and autonomy supportive parenting.

3 | RESULTS

3.1 | Prevalence of digital location tracking

As seen in Table 3, 53% of college students reported that their parent(s)/caregiver(s) never engaged in digital location tracking (henceforth "never-trackers"), with 36.1% reporting their parent(s)/caregiver(s) currently track their location (henceforth "current-trackers"), and 11.0% reporting that their parent(s)/caregiver(s) had previously engaged in digital

TABLE 3 Demographic comparisons of digital location tracking by parent(s)/caregiver(s).

	Digital location tracking			
	Never *n* (%)	Past *n* (%)	Current *n* (%)	Test Statistic
Total	329 (53.0%)	68 (11.0%)	224 (36.1%)	
School				$\chi2$ (2) = 0.76, p = .684
4-year university	254 (52.9%)[a]	50 (10.4%)[a]	176 (36.7%)[a]	
Community college	75 (53.2%)[a]	18 (12.8%)[a]	48 (34.0%)[a]	
Living situation				$\chi2$ (2) = 2.65, p = .266
With parent/caregiver	99 (49.5%)[a]	20 (10.0%)[a]	81 (40.5%)[a]	
Not with parent/caregiver	230 (54.5%)[a]	48 (11.4%)[a]	142 (33.8%)[a]	
Race				$\chi2$ (6) = 25.49, p < .001
White	90 (41.5%)[a]	26 (12.0%)[a]	101 (46.5%)[b]	
Black	130 (65.0%)[b]	15 (7.5%)[a]	55 (27.5%)[a]	
Latinx	50 (54.3%)[a]	11 (12.0%)[a]	31 (33.7%)[a]	
Other	109 (54.2%)[a]	26 (12.9%)[a]	66 (32.1%)[a]	
Gender identity				$\chi2$ (4) = 3.54, p = .472
Female	237 (54.0%)[a]	43 (9.8%)[a]	159 (36.2%)[a]	
Male	76 (53.5%)[a]	19 (13.4%)[a]	47 (33.0%)[a]	
Other	10 (40.0%)[a]	4 (16.0%)[a]	11 (44.0%)[a]	
	M (SD)	*M* (SD)	*M* (SD)	
Age	19.22 (1.66)[b]	19.41 (1.66)[b]	18.73 (1.14)[a]	F (2, 618) = 9.23, p < .001
Caregiver education	4.34 (1.42)[b]	4.49 (1.41)[a]	4.67 (1.32)[a]	F (2, 617) = 3.75, p = .024
Parental involvement	5.28 (1.38)[b]	5.56 (1.28)[b]	5.65 (1.26)[a]	F (2, 618) = 5.60, p = .004

Note: Each subscript letter denotes a subset of tracking category whose column proportions do not differ significantly from each other at the .05 level.

location tracking but no longer do (henceforth "past-trackers"). Digital location tracking prevalence was similar in our community college (34.0% current, 12.8% past) and 4-year university samples (36.7% current, 10.7% past), and between students who live with their parent/caregiver (40.5% current, 10.05% past) and those who did not (33.8% current, 11.4% past). Current-trackers were younger on average (M_{age} = 18.73, SD = 1.14) than past-trackers (M_{age} = 19.41, SD = 1.66) and never-trackers (M_{age} = 19.22, SD = 1.66). Current-trackers tended to come from higher socioeconomic status families (as indicated by having a parent/caregiver with higher education) than never-trackers. Students who identified as White were overrepresented in the current-trackers (46.5%) relative to Black students (27.5%), Latinx students (33.7%), and those of other race/ethnicities (32.1%). Students of all gender identities were similarly likely to be digitally location tracked by their parent(s)/caregiver(s). Current-trackers tended to report higher levels of parent/caregiver involvement (M = 5.65, SD = 1.26) than never-trackers (M = 5.28, SD = 1.38).

Of the 224 (36.1%) college students who were current-trackers, 78.6% reported that they also had current access to their parent/caregiver's location (30.5% of the total sample). Of the 68 (11.0%) of college students who were past-trackers, 23.5% reported that they also previously tracked their parent/caregiver's location (7.8% of the total sample). Thus, it is important to note here that digital location tracking within the family context was often a two-way-street in which both members of the parent/caregiver-college student dyad had access to the other's digital location (especially among the current-trackers). Interestingly, there was a small number of students (4.0%) who currently or previously tracked their parent/caregiver, but the parent/caregiver did not track the college student's current or past location. Given the substantial overlap between parent/caregiver tracking of the college student and the college student having access to their parent/caregiver's location, we focus analyses on the parent/caregiver tracking of their college student.

3.2 | Context and reasons for tracking

Among college students who were current-trackers, 82.5% endorsed concerns for safety as their parent(s)/caregiver(s) main motivation for digital location tracking, 5.4% (n = 12) chose convenience, and 7.1% (n = 15) endorsed control. There were 12 students (5.4% of sample) that provided a write in option, where seven indicated several reasons why their parent(s)/caregiver(s) digitally tracked them (e.g., safety *and* convenience). Students that were previous-trackers reported that it stopped around the age of 17 on average (M = 17.27, SD = 1.63). A plurality (29.4%) of previous-trackers reported that tracking ceased due to their request, 25% reported that their parent(s)/caregiver(s) decided to no longer track them, and 14.7% reported that the parent/caregiver-college student dyad collaboratively decided to cease tracking. The majority (69.6%) of students who had current access to their parent(s)/caregiver(s) digital location endorsed primarily tracking their parents/caregivers for safety reasons, followed by convenience (22.2%), and control (3.0%).

3.3 | Perceived parental autonomy support and helicopter parenting

As seen in Table 4, when controlling for gender, race/ethnicity, caregiver education, and parental involvement, past parent/caregiver digital location tracking was unrelated to college student perceptions of autonomy support (b = −.05, SE = .12, p = .705, β = −.01) and helicopter parenting (b = .07, SE = .12, p = .563, β = .02) by their primary parent/caregiver. Students who were current-trackers endorsed higher perceptions of helicopter parenting (b = .21, SE = .09, p = .017, β = .10) and lower perceptions of autonomy support from their parent/caregiver (b = −.21, SE = .07, p = .004, β = −.07) compared with never-trackers.

As a sensitivity analysis, we also tested associations between digital location tracking and perceptions of helicopter parenting and autonomy supportive parenting without controlling for parental involvement. Past parent/caregiver digital location tracking was unrelated to college student perceptions of autonomy support (b = .17, SE = .18, p = .337, β = .04) and helicopter parenting (b = .09, SE = .13, p = .472, β = .03) by their primary caregiver/parent. Consistent with primary analyses, students who were current-trackers endorsed higher perceptions of helicopter parenting (b = .22, SE = .09, p = .009, β = .11), but the association between current parent/caregiver digital location tracking and college student perceptions of autonomy support from their parent/caregiver was reduced to nonsignificance once parental involvement was removed from the model (b = .08, SE = .11, p = .469, β = .03).

4 | DISCUSSION

Despite recent research examining prevalence (Burnell et al., 2023) and parental motivations for engaging in digital location tracking of their children (Widmer & Albrechtslund, 2021), we know little about how and why families may continue to digitally track their children as they transition to college, and how this digital manifestation of parent/caregiver monitoring

TABLE 4 Associations between digital location tracking and helicopter parenting, and parental autonomy support.

	Helicopter parenting			Autonomy support		
	***b* (SE)**	***p***	***β***	***b* (SE)**	***p***	***β***
Male gender identity	−.14 (.09)	.117	−.06	−.11 (.08)	.161	−.03
Other gender identity	−.13 (.19)	.488	−.03	−.13 (.13)	.331	−.02
Black race	**.41 (.09)**	**<.001**	**.20**	**−.23 (.08)**	**.002**	**−.08**
Latinx race	**.36 (.11)**	**.001**	**.13**	−.12 (.10)	.237	−.03
Other race	**.64 (.11)**	**<.001**	**.25**	**−.34 (.10)**	**<.001**	**−.10**
Caregiver education	.01 (.03)	.744	.01	.01 (.03)	.692	.01
Parental involvement	.05 (.03)	.104	.07	**.79 (.02)**	**<.001**	**.79**
Current tracking	**.21 (.09)**	**.017**	**.10**	**−.21 (.07)**	**.004**	**−.07**
Past tracking	.07 (.12)	.563	.02	−.05 (.12)	.705	−.01

Note: Raw regression coefficients (*b*), SE, *p*, and standardized coefficients (*β*) are reported. Significant ($p \leq .05$) associations are bolded.

may be undermining developmental milestones in this developmental period (i.e., autonomy development and sustained parent-child relatedness). The present study is the first to describe the prevalence and demographic correlates of parent/caregiver digital location tracking of their college student children and tested whether students who reported being digitally tracked by their parent(s)/caregivers(s) perceived their primary parent/caregiver as engaging in more helicopter parenting and being less supportive of their autonomy.

Digital location tracking was quite common in our sample of community college and 4-year university students, with nearly half of our sample endorsing currently (36.1%) or previously (11.0%) being digitally tracked. This finding is consistent with a representative sample of North Carolina adolescents (aged 12–18 years) collected in 2018, which found that 50% of adolescents' parents digitally tracked their location (Burnell et al., 2023). Inconsistent with previous research suggesting more tracking of female adolescents (Burnell et al., 2023), we found no evidence of gender differences in digital location tracking. As only 22.7% of our sample identified as male, it is possible that this lack of representativeness accounts for this departure from past results.

We found that White students were overrepresented among current-trackers, whereas participants who identified as Black were overrepresented among never-trackers. This finding differs from the only study of digital location tracking in adolescence (Burnell et al., 2023), which revealed no racial/ethnic differences, and from studies of offline parental monitoring in adolescence, which suggest that non-White parents/caregivers may hold parenting attitudes that encourage more monitoring compared to their White counterparts (Jambunathan et al., 2000; Lansford et al., 2018; Magariño et al., 2021). Our finding is especially surprising given that parents of color endorse the need to maintain safety as a primary motivation for offline monitoring (Sukk & Siibak, 2021), and the highest endorsed motivation for digital location tracking in our sample was for safety. We also considered whether socioeconomic status might restrict some families' ability to access digital location tracking technology, though the fact that most smartphones come preloaded with free, native apps for digital location tracking (e.g., Apple's Find My Friends) and recent estimates (Pew Research Center, 2021) suggest that nearly all young adults (96%) and the vast majority of parent-aged adults (83%–95%) across the socioeconomic spectrum today own a smartphone make this possibility less likely.

The transition to college is a developmental period in which children strive for increased autonomy and self-reliance, which may be curtailed by excessive parental monitoring and control through digital technology (Jensen-Racz et al., 2017). Our finding that current-trackers saw their primary parent/caregiver as engaging in more helicopter parenting behaviors and as less supportive of their autonomy (relative to never-trackers) is consistent with this prior research and theory which suggest that high levels of parental involvement are likely to be perceived as intrusive and autonomy inhibiting, which may negatively impact youth's psychosocial adjustment (Padilla-Walker and Nelson 2012). Importantly, associations emerged over and above associations with general parental involvement, suggesting that this digital manifestation of parental involvement and monitoring might be uniquely problematic for student perceptions of their parent/caregivers' autonomy inhibiting and helicopter parenting.

However, it must also be noted that the effect sizes here ($\beta = -.07$ and .10, suggesting about a tenth of a standard deviation difference between the current-trackers and the never-trackers on perceptions of helicopter and autonomy supportive parenting) were modest; digital location tracking is far from a strong determinant of college students' perceptions of their parent/caregiver's parenting. Further, in a sensitivity analysis, digital location tracking was not associated with perceived parent/caregiver support for autonomy; this association was only significant in the model that controlled for general parent/

caregiver involvement (which was associated with lower perceptions of autonomy support). In reality, digital and offline parental involvement are intricately intertwined such that it would be difficult to partial out digital involvement from offline involvement, and thus engagement in digital location tracking may be functionally inconsequential to college student's perception of autonomy supportive parenting. The majority of current-trackers perceived digital location tracking as primarily motivated by parent/caregiver concern for safety (rather than desire for control), and digital location tracking was largely mutual (i.e., both parent/caregiver and the student track one another). This overlaps somewhat with our past work, in which only a few aspects of parent-emerging adult text messaging (including for purposes of monitoring or behavioral control) were linked with college student perceptions of their parents' being less supportive of their autonomy (Brown et al., 2023) and digitally intrusive (Jensen et al., 2021, 2023). The normative and mutual nature of digital location tracking here, along with small but significant associations with perceived parent/caregiver helicopter and autonomy supportive parenting underscores the importance of delving deeper into how college students and their parents/caregivers use and construe modern tools that facilitate unprecedented amounts of contact and knowledge within the parent/caregiver-college student dyad.

4.1 | Limitations and conclusions

The present study is the first to examine the prevalence and correlates of parent/caregiver digital location tracking of college students, using a diverse sample of 4-year university and understudied community college students. Nonetheless, our findings must be interpreted in light of limitations, including its cross-sectional design, predominantly female sample, and limited information on the college student's parents/caregivers. For example, we are unable here to explore whether the 4% of students who tracked their parent/caregivers location but whose parent/caregiver did not track theirs might be distinct (e.g., with parents/caregivers who are older or who have a health condition). Further, we relied exclusively on student reports of parenting, including their knowledge of parent/caregiver digital location tracking; it is possible that some parents/caregivers could have been covertly engaging in digital location tracking without their child's knowledge, especially before age 18 years when this is legal in most US states (Oostveen et al., 2014). Covert digital location tracking would likely have different implications for perceived helicopter and autonomy supportive parenting, were the child to become aware of it. Further, our measure of digital location tracking asked about "parent(s)/caregiver(s)," but our measures of helicopter parenting and autonomy support asked only about the "primary parent/caregiver;" thus, it is possible that the parent/caregiver doing the digital location tracking was not the same one being reported on our outcome measures.

Our findings suggest that digital location tracking is a fairly common practice, and we hope that our preliminary cross-sectional insights will spur future into parent/caregiver digital location tracking and its associations (both short- and long-term) with college student adjustment. Future research should consider parent/caregiver motivations for engaging in digital location tracking (alongside how these may differ from their child's willingness and own motivations to share their location) and ask family members about how digital location tracking influences their relationships. These questions will give greater insight into how location tracking may be helping or hindering attainment of developmental milestones like autonomy and sustained parent-child relatedness in the digital age. Our findings have implications for those invested in the development of youth (e.g., parents/caregivers, clinicians, higher education professionals) who may be wondering if most families keep/desist digital location tracking in the college years, and whether this digital location tracking may be harming the parent–child relationship or their child's autonomy development. Results further suggest that clinicians and higher education professionals may benefit from the recognition that digital location tracking may be increasingly normative within the parent–child relationship into the college years.

AUTHOR CONTRIBUTIONS

Gregory E. Chase, Morgan T. Brown, Jessica L. Navarro, Melissa A. Lippold, and Michaeline Jensen contributed to conception and design of the study. Gregory E. Chase organized the database. Gregory E. Chase and Morgan T. Brown performed the statistical analyses and wrote the first draft of the manuscript. Jessica L. Navarro contributed to the development of survey questions. Gregory E. Chase, Morgan T. Brown, Jessica L. Navarro, and Michaeline Jensen contributed to the interpretation of findings. Jessica L. Navarro, Melissa A. Lippold, and Michaeline Jensen reviewed and edited the manuscript. Gregory E. Chase, Melissa A. Lippold, and Michaeline Jensen oversaw implementation and administration of the larger study from which the data are drawn. All authors have substantially contributed to the manuscript, approved this submission, and agreed to be responsible for the scientific accuracy and integrity of this work.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

The studies involving human subjects were reviewed and approved by University of North Carolina at Greensboro Institutional Review Board [IRB-FY21-217]. The participants provided their written informed consent to participate in this study.

ORCID

Gregory E. Chase http://orcid.org/0009-0006-9412-9463

REFERENCES

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*(5), 469–480. https://doi.org/10.1037/0003-066X.55.5.469

Brown, M. T., Jensen, M., & Hussong, A. M. (2023). Parent-emerging adult text interactions and emerging adult perceived parental support of autonomy. *Journal of Social and Personal Relationships*. https://doi.org/10.1177/02654075231167347

Burnell, K., Andrade, F. C., Kwiatek, S. M., & Hoyle, R. H. (2023). Digital location tracking: A preliminary investigation of parents' use of digital technology to monitor their adolescent's location. *Journal of Family Psychology*, *37*, 561–567. https://doi.org/10.1037/fam0001067

Darlow, V., Norvilitis, J. M., & Schuetze, P. (2017). The relationship between helicopter parenting and adjustment to college. *Journal of Child and Family Studies*, *26*, 2291–2298. https://doi.org/10.1007/s10826-017-0751-3

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & Mac Iver, D. (1993). Development during adolescence: The impact of stage-environment fit on young adolescents' experiences in schools and in families. *American Psychologist*, *48*(2), 90–101. https://doi.org/10.1037/0003-066X.48.2.90

Enders, C., & Bandalos, D. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal*, *8*(3), 430–457. https://doi.org/10.1207/S15328007SEM0803_5

Fingerman, K. L. (2017). Millennials and their parents: Implications of the new young adulthood for midlife adults. *Innovation in Aging*, *1*(3), igx026. https://doi.org/10.1093/geroni/igx026

Gomez, R., & McLaren, S. (2006). The association of avoidance coping style, and perceived mother and father support with anxiety/depression among late adolescents: Applicability of resiliency models. *Personality and Individual Differences*, *40*(6), 1165–1176. https://doi.org/10.1016/j.paid.2005.11.009

Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). Inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology*, *83*(4), 508–517. https://doi.org/10.1037/0022-0663.83.4.508

Jacobson, K. C., & Crockett, L. J. (2000). Parental monitoring and adolescent adjustment: An ecological perspective. *Journal of Research on Adolescence*, *10*(1), 65–97. https://doi.org/10.1207/SJRA1001_4

Jambunathan, S., Burts, D. C., & Pierce, S. (2000). Comparisons of parenting attitudes among five ethnic groups in the United States. *Journal of Comparative Family Studies*, *31*(4), 395–406. https://www.jstor.org/stable/41603709

Jargon, J. (2021). Quit tracking your kids' phones when they head off to college. *The Wall Street Journal*. https://www.wsj.com/articles/quit-tracking-your-kids-phones-when-they-head-off-to-college-11629550800. Accessed July 16th, 20 23

Jensen, M., Hussong, A. M., & Haston, E. (2021). Digital parenting of emerging adults in the 21st century. *Social Sciences*, *10*(12), 482. https://doi.org/10.3390/socsci10120482

Jensen, M., Navarro, J. L., Brown, M. T., & Hussong, A. M. (2023). Dyadic Parent–college student digital interaction styles. *Journal of Family Psychology*, *37*, 864–874. https://doi.org/10.1037/fam0001117

Jones, A. (2021). Child-tracking apps are growing. Although they help parents keep tabs, are they hurting families in exchange for peace of mind? *BBC*. Retrieved on July 16, 2023, from https://www.bbc.com/worklife/article/20211105-the-parents-who-track-their-children

Kins, E., Beyers, W., Soenens, B., & Vansteenkiste, M. (2009). Patterns of home leaving and subjective well-being in emerging adulthood: The role of motivational processes and parental autonomy support. *Developmental Psychology*, *45*(5), 1416–1429. https://doi.org/10.1037/a0015580

Klein, M. B., & Pierce, J. D. (2009). Parental care AIDS, but parental overprotection hinders, college adjustment. *Journal of College Student Retention: Research, Theory & Practice*, *11*(2), 167–181. https://doi.org/10.2190/CS.11.2.a

Kwon, K. A., Yoo, G., & Bingham, G. E. (2016). Helicopter parenting in emerging adulthood: Support or barrier for Korean college students' psychological adjustment? *Journal of Child and Family Studies*, *25*(1), 136–145. https://doi.org/10.1007/s10826-015-0195-6

Lansford, J. E., Godwin, J., Al-Hassan, S. M., Bacchini, D., Bornstein, M. H., Chang, L., Chen, B. B., Deater-Deckard, K., Di Giunta, L., Dodge, K. A., Malone, P. S., Oburu, P., Pastorelli, C., Skinner, A. T., Sorbring, E., Steinberg, L., Tapanya, S., Alampay, L. P., Uribe Tirado, L. M., & Zelli, A. (2018). Longitudinal associations between parenting and youth adjustment in twelve cultural groups: Cultural normativeness of parenting as a moderator. *Developmental Psychology*, *54*(2), 362–377. https://doi.org/10.1037/dev0000416

Magariño, L. S., Evans, M. C., Duong, J. B., Villodas, F., & Villodas, M. T. (2021). Racial/ethnic group differences in parenting attitudes among at-risk emerging adults: The roles of adversity, relationship quality, and caregiver involvement and attitudes. *Child Abuse & Neglect*, *111*, 104810. https://doi.org/10.1016/j.chiabu.2020.104810

Marx, G., & Steeves, V. (2010). From the beginning: Children as subjects and agents of surveillance. *Surveillance & Society*, *7*(3/4), 192–230. https://doi.org/10.24908/ss.v7i3/4.4152

Mills, R., Mann, M. J., Smith, M. L., & Kristjansson, A. L. (2021). Parental support and monitoring as associated with adolescent alcohol and tobacco use by gender and age. *BMC Public Health*, *21*, 2000. https://doi.org/10.1186/s12889-021-12119-3

Muthén, L. K., & Muthén, B. O. (2021). *Mplus user's guide* (8th ed.). Muthén & Muthén.
Oostveen, A. M., Vasalou, A., Van den Besselaar, P., & Brown, I. (2014). Child location tracking in the US and the UK: Same technology, different social implications. *Surveillance & Society*, *12*(4), 581–593. https://doi.org/10.24908/ss.v12i4.4937
Padilla-Walker, L. M., Nelson, L. J., & Knapp, D. J. (2014). Because I'm still the parent, that's why!" Parental legitimate authority during emerging adulthood. *Journal of Social and Personal Relationships*, *31*(3), 293–313. https://doi.org/10.1177/026540751349494
Padilla-Walker, L. M., & Nelson, L. J. (2019). Parenting emerging adults. In M. H. Bornstein (Ed.), *Handbook of parenting: Children and parenting* (pp. 168–190). Routledge/Taylor and Francis Group. https://doi.org/10.4324/9780429440847-5
Padilla-Walker, L. M., & Nelson, L. J. (2012). Black hawk down? Establishing helicopter parenting as a distinct construct from other forms of parental control during emerging adulthood. *Journal of Adolescence*, *35*(5), 1177–1190. https://doi.org/10.1016/j.adolescence.2012.03.007
Pew Research Center. (2021). Mobile fact sheet. Retrieved on October 16, 2023, from https://www.pewresearch.org/internet/fact-sheet/mobile/
Racz, S. J., Johnson, S. L., Bradshaw, C. P., & Cheng, T. L. (2017). Parenting in the digital age: Urban black youth's perceptions about technology-based communication with parents. *Journal of Family Studies*, *23*(2), 198–214. https://doi.org/10.1080/13229400.2015.1108858
Schiffrin, H. H., Liss, M., Miles-McLean, H., Geary, K. A., Erchull, M. J., & Tashner, T. (2014). Helping or hovering? The effects of helicopter parenting on college students' well-being. *Journal of Child and Family Studies*, *23*(3), 548–557. https://doi.org/10.1007/s10826-013-9716-3
Segrin, C., Woszidlo, A., Givertz, M., & Montgomery, N. (2013). Parent and child traits associated with overparenting. *Journal of Social and Clinical Psychology*, *32*(6), 569–595. https://doi.org/10.1521/jscp.2013.32.6.569
Soenens, B., Vansteenkiste, M., Lens, W., Luyckx, K., Goossens, L., Beyers, W., & Ryan, R. M. (2007). Conceptualizing parental autonomy support: Adolescent perceptions of promotion of independence versus promotion of volitional functioning. *Developmental Psychology*, *43*(3), 633–646. https://doi.org/10.1037/0012-1649.43.3.633
Sukk, M., & Siibak, A. (2021). Caring dataveillance and the construction of "good parenting": Estonian parents' and pre-teens' reflections on the use of tracking technologies. *Communications*, *46*(3), 446–467. https://doi.org/10.1515/commun-2021-0045
Whorton, R., Almonte, D., Steiger, D., Robins, C., Gentile, C., & Bertling, J. (2021). Beyond nuclear families: Development of inclusive student socioeconomic status survey questions. *ETS Research Report Series*, *2021*(1), 1–25. https://doi.org/10.1002/ets2.12332
Widmer, S., & Albrechtslund, A. (2021). The ambiguities of surveillance as care and control: Struggles in the domestication of location-tracking applications by Danish parents. *Nordicom Review*, *42*(s4), 79–93. https://doi.org/10.2478/nor-2021-0042

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