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Transition planning for youth with traumatic brain injury: Findings from the National Longitudinal Transition Survey-2[1]

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Abstract.
BACKGROUND: Despite of a growing body of research on vocational and educational difficulties for students with traumatic brain injury (TBI), only limited empirical studies specifically examined how school transition services facilitate later employment outcomes.
OBJECTIVE: This exploratory, prospective longitudinal study examined the prevalence of employment and characteristics of transition planning practices that promoted positive school-to-work transition for students with TBI.
METHOD: The participants ($n = 200$) was drawn from the National Longitudinal Transition Study-2 (NLTS-2), a ten-year study which followed a large nationally representative sample of youth with disabilities through secondary education in into young adulthood. Logistic regression was used to investigate the associations between student, school, and collaborative engagement in the planning process and employment outcomes up to 8 years after high school.
RESULTS: Among youth with TBI, 51% held current employment at the time of interview and 73% had been employed at any time after high school. Findings showed that students with TBI who had transition goals for postsecondary education were more likely to be employed at some point since leaving high school. The findings also support active student engagement and leadership in the transition planning process, and the inclusion of outside organizations and individuals.
CONCLUSIONS: Findings indicate the impact of student, school and adult service agency engagement in transition planning processes. Implications for educational practices and future research are discussed.

Keywords: Traumatic brain injury, school-to-work transition, postschool outcomes

1. Introduction

Traumatic brain injuries (TBI) in children frequently result in a variety of problems such as cognition and memory deficits, behavior problems, social dysfunction, and poor academic performance (Schwartz et al., 2003; Taylor et al., 2002; Yeates, 2000; Yeates et al., 2004). Research has also found that the likelihood of such problems increases with more severe injuries and may result in long-term impairment (Catroppa, Anderson, Morse, Haritou, & Rosenfeld, 2008; Schwartz et al., 2004; Yeates, 2000). Each year about 1.7 million (Centers for Disease Control, 2010) Americans sustain TBI. While those over age 70 have the highest prevalence rate for TBI hospitalization, individuals between

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the ages of 15 and 25 are the second most likely group, clearly during a time when preparation for further education, employment and career is paramount (Thurman, Coronado, & Selassie, 2013; Wehman, 2013).

Adolescents with TBI face unique challenges as they prepare for adulthood. Evidence has shown continuing medical and physical problems as well as vocational and education difficulties for adults with TBI (Hoofien, Gilboa, Vakil, & Donovick, 2001). Anderson, Brown, Newitt, and Hoile (2009) conducted a follow-up study of 124 adult survivors of childhood TBI. They found that injury sequelae persisted into adulthood and negatively affected both educational achievement and employment status. Severity of injury was the strongest outcome predictor in both areas.

More recently, Todis, Glang, Bullis, Ettel, and Hood (2011) conducted a longitudinal study on the post-school outcomes of 89 youth with TBI over an eight-year time period. They found that no more than 44% of this group was employed at any given time. At age 25, approximately 60 % were employed (74% of males, 35% of females). Among those who were employed, 81.3% worked at entry level, unskilled, or semi-skilled jobs. They also found that those who were employed at school exit generally had more severe injuries, had an earlier age of injury, and were less likely to have had rehabilitation services, suggesting that they received more school-based employment assistance than those with less severe injuries.

Despite a growing body of research on vocational and educational difficulties for children and youth with TBI, little is known regarding the services that equip successful transition from school to work for students with TBI (Todis & Glang, 2008). Two recent systematic reviews have been published on correlates of successful transition from school to work (Landmark, Ju, & Zhang, 2010; Test et al., 2009). These reviews have suggested that effective transition planning while in school is an important correlate of employment after high school, yet none of the studies reviewed in these two reviews included youth with TBI due to an absence of such research.

While other studies have explored the impacts of pediatric TBI on future employment (Anderson et al., 2011; Todis & Glang, 2008; Todis et al., 2011), this study is unique and contributes to the literature in two ways. First, prior research on adult employment following pediatric TBI has focused largely on static variables, those that cannot be altered or manipulated, such as the severity or nature of the injury, race/ethnicity, gender, age at the time of injury, and socioeconomic status, factors that also dominate the return to work literature for adults with TBI (Yasuda, Wehman, Targett, Cifu, & West, 2001). The current study, however, focused on factors that relate to the school-to-work transition planning process itself which are manipulable by school systems. The study therefore has the potential to identify school-based practices that are effective in achieving successful transition for students with TBI.

Second, this study uses data from the second National Longitudinal Transition Study (NLTS-2) which followed a large, nationally representative sample of students with disabilities including TBI, and examines the impact of a broad array of factors. NLTS-2 participants were ages 13 through 16 and in at least 7th grade on December 1, 2000. Data were collected in five biennial Waves. The oldest youth were 26 at the time of final Wave of data collection (Wave 5). Prior studies have been conducted using the NLTS-2 data to identify effective practices across disabilities (Carter, Austin, & Trainor, 2011a,b; Wagner & Davis, 2012). However, no prior NLTS-2 studies have narrowed the focus to students with TBI and investigated how high schools prepared them for transition. It is this group who will require careful transition planning for appropriate interventions that will lead to improved employment prospects after school.

The aim of this exploratory study is to analyze the relationships between the transition planning process and post-school employment for youth with TBI using the NLTS-2. We looked for those modifiable variables, if any, which were potentially associated with the likelihood of current employment at time of interview or ever being employed after high school. The research question to be addressed is this: What school-based practices or characteristics appear to promote successful transition to employment for youth with TBI?

2. Method

2.1. Participants

Participants in this study were students who had an educational diagnosis of TBI and had previously been involved in the NLTS-2. For this study, employment outcomes reported in Wave 5 were used, which would give participants the maximum amount of time within the confines of the study to enter employment (after high school up to eight years). Students were excluded from this analysis if information regarding post-school employment were missing.

The final sample size of the study group was 200 students with an educational disability of TBI and had valid post-school employment outcome measures. The majority of participants were male (73%). Nearly 74% were white, 13% were African-American, 11% were Hispanic, and 2% were others. The majority of participants (83%) had household income above poverty level. More than 90% of participants' parents/guardians had completed high school. This study conducted bivariate tests to investigate potential bias and examine whether there is difference between the study group and attrition group on demographic characteristics, including gender, race/ethnicity, poverty, parental education (high school completion or not), and any health problem. The study group was comparable to the attrition group on these demographic characteristics except gender and any health problem. The demographic background variables were further controlled to adjust possible bias and better the estimates on the relations between school-based practices and post-school employment in this longitudinal study.

2.2. Procedure

The NLTS-2 was conducted by SRI international for the U.S. Department of Education (DOE) beginning in the school year 2000-01 and included an initial sample of 11,700 youth with disabilities. The sampling strategies and weighting design of the NLTS-2 ensure that the student samples were representative of national prevalence rates across disability groups, geographic areas, and other factors. The estimates from the national data, therefore, can be generalized to students with disabilities, aged 13–16, in at least 7th grade on December 1, 2000. NLTS-2 data were made available to the researchers through a Restricted-Use Data License from the Institute of Educational Sciences (IES), U.S. DOE following necessary controls for security of the data. The study was also reviewed by the authors' university Institutional Review Board and received expedited approval.

The NLTS-2 used multiple instruments to collect data from a variety of sources, including (a) completion of separate telephone interviews with youth and their parents (Family/Youth Surveys), (b) surveys completed by school staff who were familiar with the student, his/her educational program, and academic status (Teacher/Student's School Program Survey), (3) a survey regarding characteristics of the school and educational environment (School Characteristics Survey) (4) direct youth assessments of academic skills, and (5) review of the student's educational transcripts. This study used two primary instruments: School Program Survey (at Waves 1 and 2) and Parent/Youth Survey (at Wave 5), to provide the information regarding transition planning process and employment outcomes.

2.3. Measures

2.3.1. Outcome measures

This study examined students' successful entry into post-school employment. Two commonly-used measures of employment delineated in previous studies (see Carter et al., 2011a,b) were used in this study, including whether students a) were currently employed at the time of the Wave 5 Parent/Youth Survey; and b) had ever engaged in employment up to eight years after high school.

2.3.2. Predictors

This study aims to investigate the effective school practices and services provided during the school-to-work transition, which might be associated with any employment after high school for students with TBI. Items related to the transitional planning process were extracted from the Wave 1 and Wave 2 students' School Program Survey. Those items included student goal-setting (e.g., postsecondary education /training, employment, or other), participation in transition planning (e.g., students, regular and special education personnel, parents, or others), support/services for his/her participation (e.g., instruction in the transition process), and collaborators in the transition process (e.g., state Vocational Rehabilitation [VR] agency, other vocational training programs, potential employers, shelter workshops, and mental health agencies).

Demographic characteristics such as gender, race/ethnicity, poverty (above or under the federal poverty line), parental education (high school completion or not), and any health problem were controlled in this study to reduce potential bias and better estimate the predictive relationship between school-based practices or characteristics and students' transition to successful employment after high school.

2.4. Data analysis

Descriptive statistics were used to delineate the prevalence of employment outcomes for students with TBI. Additionally, to investigate the relationships between transition planning practices and employment, logistic regression analyses were conducted to exam-

ine the relationships between each variable regarding student, school and program involvement and two dichotomous employment outcome measures, including 1) current employment at the time of the Wave 5 Parent/Youth Survey, or 2) ever had employment since exiting high school up to eight years with the control of demographic characteristics (gender, race/ethnicity, poverty, parental education, any health problem). Odds ratio (OR) and *p* values were listed to indicate the statistically significant findings.

3. Results

3.1. Students' transition goals

Overall, 51% of students with TBI were currently employed at the time of the Wave 5 and nearly 73% of students with TBI were ever employed since exiting high school. Table 1 presents the relationships between students' post-high-school goals and employment status after high school. None of students' post-high-school goals in their Individualized Educational Plan (IEP) was associated with their current employment in Wave 5. However, students who had goals to attend postsecondary education (2- or 4-year college) were more likely to work up to 8 years after high school. When controlling for gender, race/ethnicity, poverty, parental education, any health problem, students were 5.44 times ($p < 0.01$) as likely to ever engage in employment if they plan on attending a two- or four-year college compared to others.

3.2. Participants in transition planning

Table 2 presents the relationships between the involvement and participation of appropriate individuals (e.g., students, regular and special education personnel, parents, or others) in transition planning and employment status after high school. Students who actively participated in transition planning were significantly more likely to be currently employed (OR = 104.03, $p < 0.01$) and be ever engaged in employment after high school up to 8 years (OR = 19.64, $p < 0.01$). While students were moderately active or were leaders in the transition planning process, the odds for them to be currently employed (OR = 4.12, $p < 0.05$) or ever employed were higher (OR = 12.29, $p < 0.01$) compared to others. When general education academic teacher participated actively in transition planning in Waves 1 and 2, students were 3.91 times ($p < 0.05$) as likely to be ever engaged in employment after high school than others. The active involvement of special education teachers was also strongly associated with the increased odds of students' current employment and ever employment after high school (ORs = 6.00 and 4.02, $p < 0.01$). School administrators' participation in students' transition process was also associated with the increased odds of students' ever employment after high school (OR = 8.42, $p < 0.01$). However, with the active involvement of parent/guardians in transition planning, students were less likely to be currently employed compared to others (OR = 0.01, $p < 0.01$).

3.3. Transition preparation and supports

Table 3 presents the relationships between the support and services specified in transition planning and employment status after high school. In Waves 1 and 2, providing transition plan to support students' adult life predicts the employment status for students with TBI (currently or ever). With the transition planning to adult

Table 1
Students' Post-high-school goals and employment status after high school

	Currently employed			Ever employed		
	OR	CI (95%)	*P*	OR	CI (95%)	*P*
Postsecondary education/training						
Attend 2- or 4-year college	1.19	(0.46–3.10)	0.72	5.44	(1.71–17.32)	0.01**
Attend postsecondary voc training program	1.48	(0.58–3.78)	0.40	1.98	(0.43–9.19)	0.37
Employment						
Obtain competitive employment	0.70	(0.25–1.95)	0.48	1.45	(0.32–6.49)	0.62
Obtain sheltered employment	0.57	(0.14–2.31)	0.42	0.28	(0.06–1.34)	0.11
Obtain supported employment	1.32	(0.42–4.15)	0.62	1.47	(0.29–7.51)	0.64
Other						
Live independently	2.13	(0.76–5.98)	0.15	3.49	(0.85–14.28)	0.08
Maximize functional independence	0.43	(0.16–1.18)	0.45	0.41	(0.13–1.28)	0.12
Enhance social/interpersonal relationships	0.44	(0.14–1.35)	0.14	0.86	(0.30–2.47)	0.77

Note. OR = odds ratio; CI = confidence interval; *$p < 0.05$; **$p < 0.01$; with the control of gender, race/ethnicity, poverty, parental education (high school completion or not), and any health problem.

Table 2
Active participants in students' transition planning and employment status after high school

	Currently employed			Ever employed		
	OR	CI (95%)	*P*	OR	CI (95%)	*P*
Student	104.03	(45.02–240.39)	<0.01**	19.64	(5.28–73.04)	<0.01**
Students' moderately active participant/leader in planning	4.12	(1.07–16.58)	0.04*	12.29	(2.35–64.47)	<0.01**
General education academic teacher	2.50	(0.92–6.8)	0.07	3.91	(1.32–11.57)	0.02*
General education vocational teacher	1.16	(0.73–3.33)	0.24	1.15	(0.51–2.62)	0.73
Special education teacher	6.00	(2.42–8.10)	<0.01**	4.10	(3.59–5.33)	<0.01**
School administrator	2.63	(0.95–7.27)	0.06	8.42	(3.39–20.93)	<0.01**
School counselor	0.58	(0.23–1.49)	0.25	0.96	(0.41–2.25)	0.92
Related services personnel	2.36	(0.83–6.69)	0.10	1.98	(0.56–7.04)	0.28
Parent/guardians	0.01	(0.00–0.14)	<0.01**	0.21	(0.02–2.85)	0.23
Vocational rehabilitation counselor	0.75	(0.26–2.20)	0.59	0.41	(0.16–1.06)	0.07
Outside agency staff and others	1.50	(0.38–5.86)	0.55	0.44	(0.14–1.36)	0.15

Note. OR = odds ratio; CI = confidence interval; *$p < 0.05$; **$p < 0.01$; with the control of gender, race/ethnicity, poverty, parental education (high school completion or not), and any health problem.

Table 3
Support and services specified in transition planning and employment status after high school

	Currently employed			Ever employed		
	OR	CI (95%)	*P*	OR	CI (95%)	*P*
Planning for transition to adult life done for student	7.31	(0.70–76.57)	0.10	17.03	(1.22–23.19)	0.04*
Received instruction specifically focused on transition planning	0.74	(0.25–2.19)	0.57	0.66	(0.22–1.98)	0.45
IEP or transition plan specifies course of study to achieve transition goals	2.64	(1.20–5.77)	0.02*	1.02	(0.31–3.41)	0.97
Suitability of school program for preparing students for transition goals	1.19	(0.43–3.27)	0.73	0.90	(0.24–3.33)	0.86
Information about services available after high school provided to parents of students	0.25	(0.05–1.28)	0.09	0.57	(0.07–4.71)	0.59

Note. OR = odds ratio; CI = confidence interval; *$p < 0.05$; **$p < 0.01$; with the control of gender, race/ethnicity, poverty, parental education (high school completion or not), and any health problem.

Table 4
School contacts on behalf of students with transition planning and employment status after high school

	Currently employed			Ever employed		
	OR	CI (95%)	*P*	OR	CI (95%)	*P*
Colleges	0.94	(0.26–3.49)	0.93	0.71	(0.32–1.58)	0.37
Postsecondary voc schools	0.41	(0.15–1.09)	0.07	0.64	(0.31–1.35)	0.23
State VR agency	11.71	(3.57–38.38)	<0.01**	3.85	(1.54–9.64)	<0.01**
Other vocational programs	18.04	(4.16–78.2)	<0.01**	3.96	(0.51–3.09)	0.93
US military	0.18	(0.11–0.31)	<0.01**	72	(4–131)	<0.01**
Potential employers	0.25	(0.07–0.84)	0.03*	0.51	(0.14–1.88)	0.30
Job placement agencies	3.94	(1.15–13.53)	0.31	1.69	(0.48–5.91)	0.40
Supported employment programs	1.84	(0.70–4.84)	0.20	0.66	(0.18–2.45)	0.52
Sheltered workshops	0.12	(0.01–2.08)	0.13	0.04	(0.00–0.46)	0.02*
Mental health agencies	0.09	(0.00–12.33)	0.31	0.13	(0.01–3.58)	0.21
Social Security Administration	0.60	(0.15–2.52)	0.46	1.38	(0.26–7.27)	0.69
Supervised residential support agencies	1.30	(0.30–5.68)	0.70	0.06	(0.01–0.43)	0.01**
Adult day programs	0.95	(0.01–119.42)	0.98	0.30	(0.00–35.2)	0.57
Other social service agencies	4.23	(1.24–14.37)	0.03*	1.53	(0.42–5.55)	0.49

Note. OR = odds ratio; CI = confidence interval; *$p < 0.05$; **$p < 0.01$; with the control of gender, race/ethnicity, poverty, parental education (high school completion or not), and any health problem.

life done for students, students were more likely to be employed up to 8 years after high school (OR = 17.03, $p < 0.05$). Students who were provided with specific courses to achieve transition goals were 2.64 times ($p < 0.05$) as likely to be currently employed in wave 5 compared to others.

3.4. School contacts with service providers and organizations

Table 4 presents the relationships between the school contacts with service providers and organizations on behalf of transitioning students with TBI

and employed status after high school. With the control of demographic characteristics, students who have contacts made on their behalf with the state VR agency were more likely to be currently employed and ever engaged in employment (OR = 11.71 and 3.85, $p < 0.01$). School contacts with other vocational training programs and other social service agencies were associated with increased odds of students' current employment (OR = 18.04, $p < 0.01$; OR = 4.23, $p < 0.05$). However, the odds of current employment for those with school contacts with potential employers (OR = 0.25, $p < 0.05$) as well as the odds of ever employment for those with school contacts with sheltered workshops (OR = 0.04, $p < 0.05$) and supervised residential support agencies (OR = 0.06, $p < 0.01$) were significantly lower than others. Findings in terms of school contacts with U.S. military were mixed. School contacts with U.S. military were associated with lower odds of students' current employment (OR = 0.18, $p < 0.01$), but were related to higher odds of students' ever employment up to 8 years after high school (OR = 72, $p < 0.01$) compared to others.

4. Discussion

4.1. Summary of findings

As mentioned previously, this study is unique in that it (a) utilizes the NLTS-2 database to study the transition of students with TBI from school to work, and (b) focuses on manipulable variables related to the transition planning process. Recent systematic reviews indicated effective transition practices and found several that appeared promising, including work experiences while in school, collaboration with adult services, and inclusion in the general education curriculum (Landmark et al., 2010; Test et al., 2009). Findings from this study provide support for some of those promising practices, but fail to support others.

Regarding transition planning, the findings of this study show that those students with TBI who had transition goals for postsecondary education were more likely to be employed at some point since leaving school (see Table 1). The findings also support the theory that active student participation in the transition planning process leads to better postschool employment outcomes (see Table 2). Those who were either moderately active participants or were leaders of their own transition planning process had higher levels of post-school employment than those who were either non-participants or passive participants. While these findings provide evidence in support of the value of self-determination in transition planning, it is also notable that providing students with transition planning to adult life and specific courses to achieve transition goals significantly improve post-school employment outcomes (see Table 3).

Interagency collaboration between educational systems and adult service agencies has long been a critical and evidence-based component of transition (Test et al., 2009). As shown in Table 4, contacts between the school and some adult services did increase the likelihood of post-school employment success. Those service providers included state VR agencies, other post-secondary vocational training programs, and other social service agencies. However, presence and active participation in the transition planning meeting by state VR agency or other outside agencies did not contribute to success. A possible explanation is that these individuals may have been previously brought into the planning process, agreements had been brokered between the school and the adult agency, and therefore their presence was unnecessary in order for the student to benefit from the collaboration.

4.2. Potential impacts of the U.S. economy on study findings

This study utilized post-high school employment data for students with TBI collected during the years 2005 to 2010. During this same time period, the U.S. economy experienced an economic recession that began in 2007 and began to significantly affect employment rates in mid-2008. During this period, unemployment rose to the highest rates since 1983 and remained high until the end of the data collection period. Kay (2010), using data from the Current Population Survey (CPS) found that between October 2008 and June 2010, job losses among workers with disabilities far exceeded those of workers without disabilities. While unemployment rates increased by 2.9 percentage points (6.3% to 9.2%) for CPS respondents without disabilities, the increase was 4.9 percentage points (12.2% to 17.1%) for respondents with disabilities. The overall proportion of employed U.S. workers identified as having disabilities declining by 9% from 3.44% to 3.12%. Kay concludes that individuals with disabilities were disproportionately affected by the recession and subsequent employment difficulties such as high competition for jobs, layoffs, and terminations. Thus, it is likely that the post-high school employment experiences of this sam-

ple were influenced to some degree by the prevailing economic landscape.

4.3. Limitations

The source of data for this study, the NLTS-2, has some limitations with regard to this study. The NLTS-2 differentiated between sheltered, competitive, and supported employment during the transition planning process. However, employment outcomes were not differentiated as such in this study and therefore individuals who are working in sheltered workshops or other non-competitive options would fall under the "employed" group along with those employed competitively. Second, while the NLTS-2 Wave 1 included a substantial number of students with TBI in Wave 1, only 200 had complete outcome data through Wave 5, which may limit generalization of the findings to the population of youth and young adults with TBI who are transitioning from school to work. Third, the information regarding the severity of injury, age at injury, and post-recovery for students with TBI was limited in the national data, so the impact of the levels of injury severity and injury age on the transitional outcomes was not clear.

4.4. Future research

As noted previously, in this study post-school employment outcome measures in the NLTS-2 were not differentiate between school exiters who are employed in competitive and non-competitive work options. The value of non-competitive employment services such as sheltered workshops and day vocational programs has been a hotly debated issue for many years (Cimera, 2008; Migliore, Mank, Grossi, & Rogan, 2007). Without adding to this debate, it is self-evident that transitioning to competitive employment and non-competitive employment are totally different processes and differ greatly in their respective demands on the school system, teachers, transition specialists, families, and students. As one example, successful transition to a sheltered work program would typically hinge upon an available service slot and a funding source, whereas in the labor market students with TBI compete for positions against non-disabled applicants and would need to show that they add value to the business in terms of their work and social skills. Future research that aims to focus on post-school employment using the NLTS-2 data should attempt to exclude, to the extent possible, those attending sheltered and similar non-competitive programs from the criteria for "successful" post-school employment. One such means would be to exclude those who are earning sub-minimum wages from the study sample.

In addition, this study used two common measures of employment success associated with NLTS-2 research, (a) employed at the time of the final interview and (b) ever employed since exiting school. While these are commonly-used measures in the literature, they are very simplistic and fail to capture the essence of sustained, career-focused, valued employment experiences. Future research using the NLTS-2 should attempt to better define employment success using the richness of the data, such as sustained participation in the workforce, earnings and benefits, employment that matches student transitional goals, and similar measures.

While the findings of this study are generally favorable regarding the efficacy of certain transition planning practices, findings from non-experimental studies such as the current one produce lower levels of evidence than experimental and quasi-experimental designs. Future research on the efficacy of transition practices should use designs with higher levels of empirical rigor.

5. Conclusion

The results of study have implications for school systems as they assist students with TBI and their families to prepare for transition to adulthood. First, the more actively the student participated in the transition planning process, the greater his or her likelihood of attaining employment. School personnel should make every effort to not only ensure that students with TBI are present at IEP and transition planning meetings, but also that they are actively engaged in them – voicing their own wants and needs, making choices, setting their own goals, even leading the team meeting. Martin et al. (2006) demonstrated the effectiveness of the Self-Directed IEP model in increasing students' participation in meetings.

Second, the study highlights the importance of "thinking big" in goal-setting. While transition goals should be attainable by the student, they should also challenge the student, school, and family to achieve the best possible outcomes.

Finally, the study findings also provide support for involving adult service providers and other outside entities in transition planning. While collaboration is presented as a "best practice" in transition (Test et al., 2009), actual contact with or participation by adult

service providers occurs infrequently (Cameto, 2005). Bringing VR or other vocational service providers into the planning process can promote smoother, quicker entry into employment. For students with TBI, their physiatrist, occupational or physical therapist, or psychologist might also provide valuable information for planning.

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