

All Swirl Is Not the Same: Examining Differences Across Degrees of Swirl Intensity

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Swirl, or the back-and-forth transfer across multiple colleges, has been the focus of policymakers, practitioners, and researchers alike because of its empirical connections with retention and degree completion. However, one significant limitation in the existing literature is the treatment of swirl in a dichotomous manner, that is, students swirl, or they don't. Such a perspective ignores differences that exist across the spectrum of swirl or gradients of swirl intensity. This study specifically explored variations in attendance patterns, student characteristics, and institutional structural factors across different degrees of swirling intensity among students who exhibit minimal and substantial swirling behavior. Descriptive and inferential analyses highlighted unique attendance patterns associated with swirl and prevalent differences across degrees of swirl intensity. Implications for practitioners and future research are discussed. With the onset of COVID-19, which has propagated more serial transfer behaviors, a pressing need exists to understand swirls more comprehensively.

Research on students' postsecondary mobility has shown the pervasiveness of intercollegiate transfer (e.g., Adelman, 2006; Bach et al., 2000; Bahr, 2009; Bahr, 2009; Kearney et al., 1995; Romano & Wisniewski, 2005; Shapiro et al., 2015; Townsend, 2001). This corpus of research has demonstrated that students progress through college in unexpected patterns that include vertical, lateral, and reverse transfer, double dipping or co-enrollment, and swirl, among other patterns (Adelman, 2006; Shapiro, 2015). Student movement across multiple institutions was first documented by de los Santos and Wright (1990), who coined the term "swirling" to denote serial transferring behavior. Evidence shows its prevalence among college students. Nationally represented data tracking first-time students in 2011 showed that nearly one in five students swirled (Shapiro, 2015). Despite its prevalence, there is a dearth of research on swirl. The limited body of existing research has explored associations between swirl and student demographic characteristics (Kearney et al., 1995; Shapiro et al., 2018; Soler, 2020; Soler & Mexa, 2018; Wang & Pilarzyk, 2009), retention and degree completion (e.g. Adelman, 2006; Johnson & Muse, 2012; Strutz, 2006), and college of entry (Bach et al., 2000; Kearney, 1995; McCormick, 2003 Peter & Cataldi, 2005; Shapiro et al., 2015). However, one significant gap is the literature treats swirl uniformly without acknowledging differences across the number of transfers. The literature has operationally defined swirl as two or more transfers (e.g., de los Santos & Wright, 1990) and evaluated in a dichotomous manner (e.g., students swirl or they do not). Yet, there may be substantial differences between those who barely meet this metric and others who far exceed it, which we term swirl intensity (low intensity and high intensity, respectively) to denote the number of transfers.

The present study aims to address this limitation by providing a more comprehensive understanding of the spectrum of swirl intensity. More specifically, this study sought to explore both attendance patterns associated with different degrees of swirl intensity (e.g., the number of times a student transfers) and student demographic and institutional structural characteristic differences across variations of intensity of swirl. Due to evidence showing that COVID-19 prompted more serial transfer behaviors (Soler, 2020), a pressing need exists to understand swirl more comprehensively.

Relevant Literature and Conceptual Framework

The effects of transferring have been extensively examined in the research literature (e.g., Goldrick-Rab, 2007; Johnson, 2005; Laanan, 2004, 2007; Lakin & Elliott, 2016; Monaghan & Attewell, 2014). This robust literature has highlighted the relationship between transfer and retention and degree attainment (e.g., Glass & Harrington, 2002; Goldrick-Rab, 2007; Johnson, 2005; Laanan, 2004, 2006, 2007; Monaghan & Attewell, 2014), credit loss (Jenkins & Fink, 2015; Monaghan, & Attewell, 2014), and post-transfer issues of integration and assimilation of academic norms (D'Amico et al.,

2014; Elliott & Lakin, 2020). An underlying element embedded within this literature is that transfer denotes a non-linear path through higher education. Although students are presumed to proceed through higher education in a linear format, since the 1970s, data has shown that students engage in divergent attendance patterns (Adelman, 1992; Bach et al., 2000; Bahr, 2009; Borden, 2004; Calcagno et al., 2008; de los Santos & Wright, 1989; Goldrick-Rab, 2006; Li, 2010; McCormick, 2003; Peter & Cataldi, 2005; Romano & Wisniewski, 2005; Townsend, 2001; Yang, 2006; Yang et al., 2008; Yi, 2008). Recent evidence shows that these varied transfer trends have not ceased. The National Student Clearinghouse data indicate over 30% of students in postsecondary education transfer at least once (2015), and 25% do so more than once (Taylor & Jain, 2017). Even during the COVID-19 pandemic, a time of overall enrollment decline, transfer rates increased by 3% from pre-pandemic levels (Causey et al., 2021). Although the research literature is steeped in vertical transfer, or mobility from a 2-year to a four-year college (Townsend, 1995), these data collectively underscore a variety of transfer patterns. Researchers and policymakers have been particularly concerned with transfer behaviors because they often result in credit loss, impact degree completion, and increase college debt (e.g., Crisp et al., 2022; Jenkins & Fink, 2015; Johnson, 2005; Johnson & Muse, 2012; Laanan, 2004; 2006; 2007; Monaghan, & Attewell, 2014; Mullane, 2005). For this reason, this study is guided by human capital theory.

HUMAN CAPITAL

Human capital relates to economic capacity and the dispositions, talents, knowledge, and skills that can increase productivity (Becker, 2009; McMahon, 2009; Paulsen, 2001). Educational degrees and workforce training, which individuals can leverage to increase economic capacity, are common forms of human capital (Judge et al., 1999). Acquisition of human capital is often conceptualized as an investment (Paulsen, 2001) and encompasses any expenses that can potentially positively impact economic productivity (Paulsen, 1998). Akin to all investments, human capital necessitates a cost-benefit analysis whereby rational actors evaluate the attendant costs of engaging in a particular form of training against the possible economic benefits (Bowen, 1980; Becker, 2009). As it relates to higher education, college students attend and persist in degree completion under the premise it will increase their lifetime earnings (Judge et al., 1999; Paulsen, 1998). The expected increase in earnings, viewed from a cost-benefit analytical perspective, is estimated to outweigh the financial outlay costs in the form of tuition and foregone earnings from not immediately entering the workforce (Paulsen, 1998). There is ample research showing substantial economic benefits associated with earning a baccalaureate degree (e.g., Baum, 2014) or a high rate of return on the investment in higher education (Becker, 2009; Paulsen, 2001). Maximizing the rate of return necessitates a linear and direct path through college. Disruptions in the path, as occurs when students lose credits due to transferring, can

offset potential earnings and the rate of return associated with earning a college degree. Further, each additional disruption can acutely affect the rate of return and potentially thwart the acquisition of human capital altogether. In this regard, multiple transfers, termed swirl, may exponentially impact the return on investment into higher education and educational attainment, necessitating better comprehension of it.

SWIRL

A number of researchers encapsulated students' complex transfer behaviors and attendance trajectories into transfer typologies (see McCormick, 2003; Taylor & Jain, 2017; Townsend, 2001) that include lateral, reverse, dual enrollment, and concurrent transfer. One pattern consistently identified across typologies is swirl. Swirl was initially defined as the "back-and-forth movement" between 2-year and 4-year institutions by de los Santos and Wright (1989). However, over time, swirl has been employed to describe serial transfer (Soler & Meza, 2018). Much research has denoted its existence and extensiveness (e.g., Adelman, 1999; Shapiro et al., 2015; Shapiro et al., 2018). For instance, Shapiro et al. (2015) found that nearly twenty percent of postsecondary transfer students engaged in swirl. Despite the prevalence of swirl, there is a relative dearth of research within higher education literature. The limited existing research can be categorized into three main areas: student demographic characteristics linked to swirl, the correlation between sector and swirl, and attendance patterns of swirling students.

The most prevalent analysis of swirl has focused on its relationship with student demographic characteristics. First, research has associated swirl with non-traditional students or older students (Kearney et al., 1995; Wang & Pilarzyk, 2009) and a host of characteristics often correlated with non-traditional student status, such as being female (Soler, 2020) and being first-generation (Taylor, 2016). High financial need resulting in Pell eligibility has also been inversely connected to swirl (Soler, 2020; Soler & Meza, 2018). Put differently, students who receive Pell are less likely to swirl than their non-Pell counterparts. In terms of race/ethnicity, Soler and Meza (2018) examined how 2-year matriculants engaged in swirl (termed multi-institution attendance pattern to denote students who earned credits at two or more 2-year colleges before transferring to a four-year college). They found that African American students were more likely to swirl. Relatedly, Shapiro et al. (2018) found White and Asian students were more likely to engage in summer swirl or the temporary transfer to a 2-year for summer courses before returning back to the original institution of matriculation. Finally, poor academic performance has been positively associated with swirl (e.g., Johnson & Muse, 2012; McCormick, 2003; Wang & Pilarzyk, 2009).

Literature that has explored swirl by sector has produced confounding results, with some findings indicating 2-year entrants engage in swirl more (e.g., Bach et al., 2000; McCormick, 2003 Peter & Cataldi, 2005) and others findings showing four-year entrants swirl more (e.g., Kearney, 1995; Shapiro et al., 2015). In terms of institutional factors contributing to swirl, a handful of studies (e.g., Calcagno et al., 2008; Umbach et al., 2019) have examined institutional factors in relation to transfer student success. These works collectively have indicated that institutional size, setting, and tuition and fees are associated with the success of transfer students. Although these findings are not directly tied to swirl, their relationship with transfer students' academic success and degree completion suggests an indirect relationship with swirling behaviors.

A handful of studies have examined attendance patterns associated with multiple transfers and therefore swirl by implication, though it is noteworthy all of the studies were ensconced in the community college transfer function literature (e.g., Adelman, 1992; Bach et al., 2000; Kearney et al., 1990). Shapiro et al. (2015) followed the transfer behaviors of a nationally representative sample of students (n=2.8M) and found a high prevalence of one attendance pattern associated with swirl, which was termed summer swirl, or the temporary transfer from a 4-year to a 2-year for the purposes of taking summer courses before returning to a 4-year college. Bach et al. (2000) examined the attendance patterns within one mid-sized, urban locale of 504 student records and found that 30% of the sample fell outside the traditional vertical transfer pattern. The most common pattern, which represented 12% of the cases in the data, was starting at a 4-year, reverse transferring down to a 2-year, and then vertically transferring to a 4-year. Other common patterns included concurrent enrollment (7%) and a 3-transfer pattern (2-year to a 4-year, back to a 2-year, and back to a 4-year), which accounted for 4.5% of the cases. In total, six attendance patterns were explored, even though 20% of the cases fell outside these patterns.

The most pivotal of these studies is Kearney et al. (1995), who descriptively examined individual and institutional factors influencing the withdrawal behaviors of multiple-transfer students enrolled at a single institution. Analysis of the attendance patterns of 420 participants uncovered four pathways that encompassed 80 percent of the cases. The most common pathway through higher education was a four-year entrant reverse transferred to a 2-year and then vertically transferred to a 4-year (38% of the sample). Other pathways included 2-year entrants who vertically and then laterally transferred and 2-year entrants who laterally and subsequently vertically transferred (37.5 of the sample). The final pathway accounted for 12 percent and involved two lateral transfers. Kearney et al. (1995) performed a descriptive analysis of student demographic characteristics linked to each transfer pathway, revealing

significant differences in terms of age, financial need, and ethnicity across each pathway. However, due to the descriptive nature of the study, analyses for each demographic characteristic were completed independently of each other, precluding an understanding of covariance across these variables. Collectively, these works and others (e.g., Soler, 2020) have indicated that there is limited understanding of the inter-institutional movements swirlers undertake, and additional research identifying patterns of student attendance across institutions is needed.

The current study aims to extend the findings of Kearney et al. (1995) by enhancing understanding of swirl through an investigation of varying levels or gradients of swirl intensity. Swirl has been operationalized in the research literature as two or more transfers (e.g., de los Santos & Wright, 1990; Soler, 2020; Townsend & Dever, 1999) and treated as a dichotomous categorization that ignores differences in degrees of swirl intensity. Put differently, the literature treats swirl in a binary manner, and students who transfer twice may be vastly different from those who transfer many more times. The present study addresses this gap in the literature. To better understand student swirl, we explored differences across the spectrum of swirl and which factors may intensify or attenuate different degrees of swirl. We began by exploring variations in attendance patterns across the spectrum of swirl intensity. Next, we explored student demographic and institutional characteristic differences across varying degrees of swirl intensity. The study was guided by the following research questions:

- 1) What are the attendance patterns associated with varying degrees of swirl intensity?
- 2) What student and institutional structural characteristics are associated with varying degrees of swirl intensity?

Methods

To answer our research questions, we obtained transcript data and systematically tracked 3,444 institutional transfers by participants ($n=2,678$). Participants all transferred at least once to the study site between 2014 and 2019. However, the data set included transfers across 455 colleges in 35 states over a time period that spanned 33 years. The study site was a moderately-sized comprehensive Mid-Atlantic public university that serves close to 10,000 students annually and has a wide array of majors across four colleges: College of Business, College of Visual and Performing Arts, College of Education, and the College of Liberal Arts and Sciences. It was selected for three reasons. First, it is situated within a state committed to enhancing transfer student success. More specifically, there is a statewide general education curriculum

to facilitate all forms of transfer and guarantee acceptance of credits earned as part of an associate degree, which applies to all public colleges within the state (Education Commission of the States, 2019). In addition, the state enacted up-to-date web resources to provide college profiles and cross-college course comparisons (Education Commission of the States, 2019). Second, the study site has 15 articulation agreements with 2-years throughout the state and across state lines that produce robust transfer volume. Lastly, the institution is committed to the education of first-generation students who are over-represented as transfer students (Taylor, 2016).

VARIABLES

Operationally, we examined swirl in two distinct ways: specific patterns of enrollment across 2- and 4-year colleges, which resulted in swirl, and the number of transfers, which we termed intensity. First, using a subset of the data that engaged in swirl ($n=624$), the data were coded for specific patterns of swirl attendance. The initial coding structure was consistent with Kearney et al. (1995) in that we began tracking attendance with a student's first institution of attendance and then tracked transfers across two- and four-year colleges. However, while Kearney et al. (1995) only tracked up to 4 institutions, we tracked across all institutions in the data set. Patterns of swirl were coded in accordance with 1) the initial institution of matriculation, 2) the number of institutions, and 3) the specific pattern of swirl, such that higher numbers were associated with greater intensity of swirl. For instance, beginning at a four-year college, reverse transferring to a 2-year, vertically transferring to another four-year college, and finally transferring to the target institution (4yr—2yr—4yr—4yr) was coded distinctly from beginning at a 2-year and transferring to two four-year institutions before transferring to the target institution (2yr—4yr—4yr—4yr) even though they both involve three transfers across four institutions. Across the data, we tracked transfers across all institutions of attendance and explored more than 60 permutations of attendance spanning attendance at seven different institutions.

Second, we created an outcome variable to denote three degrees of swirl intensity. The first outcome was no engagement in swirl. The second outcome was consistent with de los Santos and Wright (1989) and others (e.g., Adelman, 2006; Soler, 2020; Townsend, 2001), who defined swirl as attendance at three institutions. We utilized this definition to denote low intensity of swirl. The third outcome was high intensity of swirl, which we operationalized as attendance at more than *three* institutions.

Our independent variables included student demographic variables, all derived from institutional records that were a combination of transcripts and self-reported admissions data. Demographic characteristics were specifically selected to be consistent with prior research (e.g. Soler 2020; Kearney, Townsend & Kearny, 1995; Soler & Meza, 2018; Taylor, 2016; Wang & Pilarzyk, 2009) and included the following:

gender (female), first-generation college student status, race/ethnicity categorized dichotomously as student of color, age, Pell award, and number of transfer credits. As can be seen in Table 1, half of all participants were female, and nearly half were first-generation students. Students of color represented one-quarter of the sample, which was consistent with the study site’s demographics. In terms of age, the sample was skewed young, with an average age of 22 (SD=3.91), though the age ranged from 17 to 61. The average Pell Award was \$784.29, but the standard deviation was \$1209.36, suggesting variation in need and family socioeconomic status. Lastly, average credits, which ranged from 0 to 200, transferred placed participants in their sophomore year (m=46; SD=24).

Table 1
Demographic Characteristics of Sample (n=2,678)

Sample Characteristics	%	M	SD
Female	51		
First-Generation	45		
Student of Color	26		
Age		21	3.89
Pell		784.29	1209.36
Transfer Credits		46	24

We also included institutional structural characteristics of participants’ first college of enrollment (see Table 2). We relied on existing research (e.g., Calcagno et al., 2008; Umbach et al., 2019) to help with variable selection. These data were derived from IPEDS and included institutional sector and control (e.g., 2-year, four-year public, four-year private), student body size, lack of racial diversity (which was operationalized as a percent of white students), tuition and fees, first-year retention rate (percent), and geographic setting. Geographic location was a measure of urbanicity and was evaluated on a four-point scale (rural=1; city =4). These variables were specifically chosen to remain consistent with prior research on the correlation between institutional characteristics and student outcomes (e.g., Calcagno et al., 2008).

Table 2*Descriptive Institutional Structural Characteristics of College of Entry*

Institutional Characteristics	%	M	SD
Student body size ^a		11.77	18.12
Tuition ^a		13.14	10.72
First-year retention		65.24	12.01
Racial diversity		58.24	13.56
Geographic setting		3.19	.92
Sector and control (starting college)			
2-year	65%		
Four-year public	18		
For-year private	17		
^a figures in thousands (000)			

ANALYTICAL STRATEGY

To answer the first research question, which centered on the prevalence and patterns of swirl, we relied on the coding of swirl. Every possible combination of attendance patterns was explored across seven transfers. To understand the prevalence of various patterns, we relied on descriptive analysis. Our second research question centered on the relationship between student demographic and institutional characteristics and varying degrees of swirl intensity. To answer this question, we relied on multinomial logistic regressions, which allowed us to predict swirl across three levels of intensity. We utilized a two-block model, which included student demographic characteristics in the first block. Given prior research has relied heavily on associations between student demographics and swirl (e.g., Soler, 2020), we sought to account for those prior to entering any other variables of interest. The second block included structural characteristics of a participant’s first college of entry. All analyses were run against low swirl intensity to provide a point of comparison.

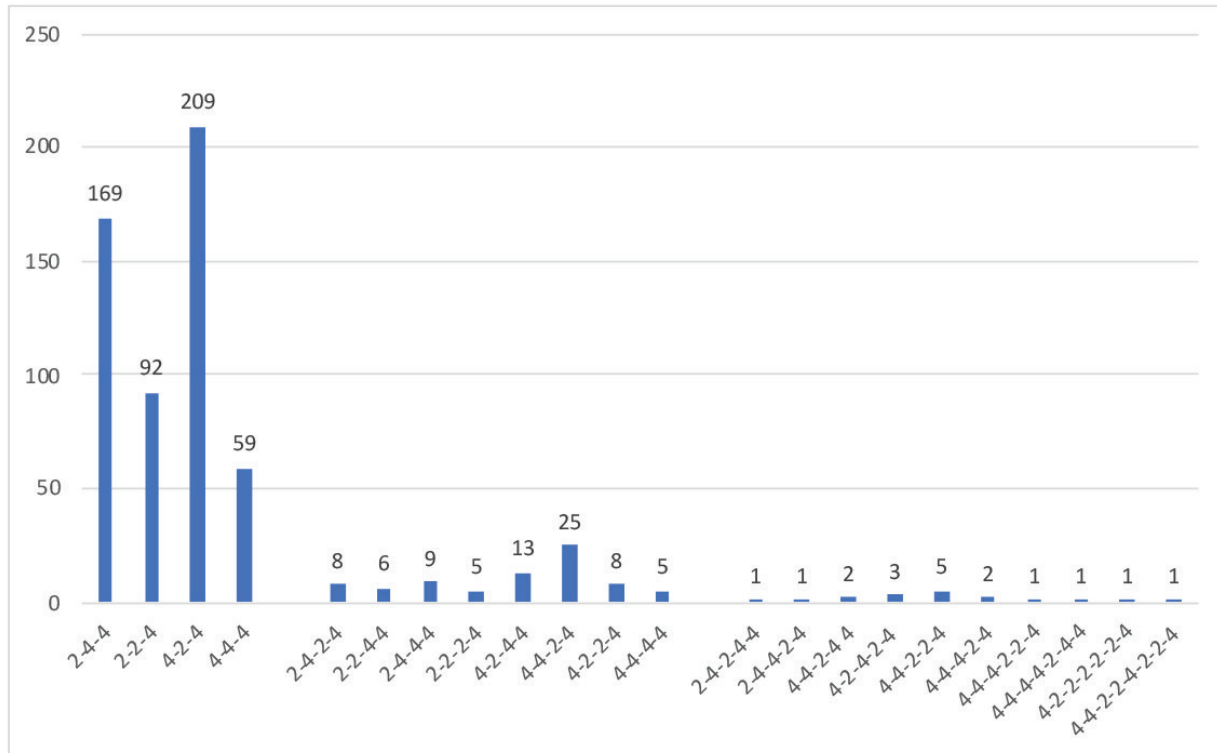
Results

Our first question centered on the prevalence and patterns of swirl intensity. Overall, we generated codes for every conceivable transfer path, encompassing up to six transfers between 2-year and 4-year colleges, along with every conceivable variation of transfer scenarios. This resulted in the exploration of over 60 possible permutations of attendance pattern combinations. From these data, we uncovered

22 distinct patterns of swirl attendance, showing great variability in attendance patterns. To aid the reader, we created Figure 1 to represent students' swirling trajectories as they enrolled across 2- and 4-year colleges. The first number indicates the starting institution and every number thereafter represents the subsequent college of enrollment. As can be seen in Figure 1, the majority of swirl cases (84%) could be classified as low intensity as they involved two transfers. The most common low swirl intensity trajectory, which accounted for one-third of the swirling patterns, involved initial matriculation in a four-year, a reverse transfer down to a 2-year, and then a vertical transfer back to the four-year sector (4-2-4). The second most common trajectory involved initial matriculation at a 2-year, followed by a vertical transfer to a four-year and then a lateral transfer to another four-year college (2-4-4). This pattern accounted for over one-quarter of the swirl in the sample. The remaining two most common patterns involved a 2-year lateral transfer to a vertical transfer (2-2-4) and three lateral transfers across 4-year colleges (4-4-4). 16% of the data engaged in high-intensity swirl and an astonishing four cases transferred six or more times. Within these data, the two most common patterns began with four-year entrants. The first most common pattern, which accounted for 25 cases, or 4% of the data, was four-year entrant, lateral transfer, reverse transfer, and then vertical transfer (4-4-2-4). The second most common pattern, with 13 cases, or 2% of the data, was four-year entrant, reverse transfer, vertical transfer, and lateral transfer (4-2-4-4).

Figure 1

Swirl Pattern of Attendance (n=626)



Note: Starting college appears as the first number followed by the second college of enrollment such that 4,2,4 denotes starting at a 4-year, then enrolling in a 2-year, and then enrolling in a 4-year.

Our second research question sought to explore the relationship between student demographic and institutional characteristics in relation to the intensity of swirl. We specifically categorized participants across three levels of swirl intensity (no swirl, low-intensity swirl, and high-intensity swirl) and ran a multinomial logistic regression. To facilitate the understanding of our findings, we showcase the results in Table 3, illustrating the comparison between non-swirl and low-intensity swirl, followed by the contrast between low and high-intensity swirl.

Comparison between No and Low-Intensity Swirl

We found age and transfer credits were positively associated with low-intensity swirl such that the odds of swirling increased with age (Exp(B) = 1.08). Each additional year of age was associated with an 8% increase in the odds of engaging in low-intensity swirl. Transfer credits were also significantly associated with low-intensity swirl, each additional credit was associated with a 2% increase in the odds of engaging in low-intensity swirl. Increases in Pell award were associated with decreases in the odds of low-intensity swirling (each additional \$100 of Pell reduced the odds of swirling by 1%; (Exp(B) =1.01). In terms of institutional characteristics, size was also negatively

associated with low-intensity swirl ($\text{Exp}(B) = 1.01$) such that each additional 1000 students was associated with a 1 percent decrease in the odds of swirling. Other institutional characteristics that were positively associated with low-intensity swirl were tuition and fees ($\text{Exp}(B) = 1.04$), setting/ urbanicity ($\text{Exp}(B) = 1.20$), and first-year retention rate ($\text{Exp}(B) = 1.03$). The most notable of these was the setting, which indicated that as urbanicity increased, the odds of engaging in low-intensity swirl increased by 20%. Finally, starting at a private 4-year college increased the odds of engaging in low-intensity swirl by 2.6 times ($\text{Exp}(B) = 2.6$).

Comparison between Low and High-Intensity Swirl

We found divergent results when we compared low-intensity against high-intensity swirl. Being female increased the odds of engaging in high-intensity swirling by 31 percent ($\text{Exp}(B) = 1.31$). Similarly, increases in Pell and the number of transfer credits increased the odds of high-intensity swirl behavior. Respectively, a \$100 increase in Pell was associated with a modest 1 percent increase in high-intensity swirl ($\text{Exp}(B) = 1.01$), and each transfer credit was associated with a 2 percent increase in high-intensity swirl ($\text{Exp}(B) = 1.02$). Interestingly, being a first-generation student was negatively associated with high-intensity swirl such that it reduced the odds of engaging in high-intensity swirling by nearly half ($\text{Exp}(B) = .52$). In terms of starting institutional characteristics, similar to prior findings, increases in first-year retention rate decreased the odds of participating in high-intensity swirl ($\text{Exp}(B) = .98$). Unlike low-intensity swirl, size, tuition and fees, and setting were all non-significant. However, we also found that starting at any 4-year college increased the odds of engaging in high-intensity swirl. Similar to low-intensity swirl, starting at a private 4-year college increased the odds in this case by almost four times ($\text{Exp}(B) = 3.7$). However, for high-intensity swirl, even starting at a public 4-year college increased the odds of high-intensity swirl by 2.5 times ($\text{Exp}(B) = 2.5$). The final model accounted for 23% of the variance in swirl (Cox and Snell $R^2 = .23$).

Table 3*Multinomial Logistic Regression Results*

	Low Swirl (compared to no swirl)		High Swirl (compared to low swirl)	
	b(SE)	OR^a	b(SE)	OR^a
Constant	7.78 (.30)***		-2.66(.45)***	
<i>Student Demographics</i>				
Female	ns		0.27(.05)**	
Age	.09(.01)***	1.08	ns	
First-Generation	ns		-0.67(.11)***	.52
Student of Color	ns			
Pell	-.01(.00)***	.99	.01(.00)***	1.01
Transfer Credits	.03(.00)***	1.02	.02(.00)*	.98
<i>Institutional Characteristics</i>				
Size	-.01(.00)***	.99	ns	
Tuition & Fees	.04(.00)***	1.04	ns	
Setting	.23(.03)***	1.20	ns	
White (%)	ns		ns	
First-year retention rate (%)	.04(.00)***	1.03	-0.02(.01)*	.98
Public 4-year ^b	ns		0.97(.15)***	2.6
Private 4-year ^b	.95(.09)***	2.6	1.31(.15)***	3.7

* p<.05 , **p <.01, ***p <.001

a Odds ratios are reported for statistically significant coefficients only;

b comparison against 2-year colleges

Limitations

This study has two distinct limitations. First, due to the power assumption associated with logistic regression, we were unable to examine more swirl gradients. For instance, the number of participants at the highest levels of swirl intensity (e.g., six transfers) could not be explored in isolation because of the distributive and power assumptions associated with multinomial logistic regression. Second, to avoid confounding results, we excluded all cases of concurrent enrollment, which could produce a more accurate accounting of attendance patterns.

Discussion

This study aimed to offer a detailed and nuanced portrayal of swirl by understanding the varying degrees of swirl intensity. We initially explored attendance patterns to discern those associated with low and high-intensity swirl. In total, we uncovered 22 unique attendance patterns associated with swirl consistent with much prior research that has denoted great variability in students' attendance trajectories (e.g., Adelman, 1992; Bach et al., 2000). The majority of cases were classified as low intensity as they involved two transfers. Among these, the most common pattern was starting at a four-year, reverse transfer to a 2-year, and then vertical transfer back to a 4-year (4-2-4). The second and third most common patterns both involved 2-year entrants and were inverse patterns: vertical transfer to a 4-year and then lateral transfer to another 4-year (2-4-4) and lateral transfer to another 2-year and then vertical transfer (2-2-4). Our findings also closely mirror those of Kearney et al. (1995), who found similar patterns prevalent among students engaging in low-intensity swirl. We also found that 16% of cases, or close to 1 in 7 students, were engaged in high-intensity swirling. The two most common patterns within these data both began with four-year entrants: lateral, reverse, followed by vertical transfer (4,4,2,4), and reverse, vertical, followed by lateral transfer (4,2,4,4). Four cases could be said to engage in extreme intensity of swirl because they transferred six or more times. Consistent with much prior research highlighting non-linear trajectories (e.g., Adelman, 1992; Bach et al., 2000; Bahr, 2009; Calcagno et al., 2008; McCormick, 2003; Townsend, 2001), the presence of instances of high-intensity swirl offers further evidence countering narratives of a straightforward and linear progression through higher education.

For our second research question, we explored differences across student demographic and institutional characteristics in relation to varying levels of swirl intensity. We conducted a specific comparison between participants who did not swirl with those who participated in low-intensity swirl, as well as between those who engaged in low-intensity and high-intensity swirl. Although prior research has explored demographic characteristics in relation to swirl, these findings contribute to the growing literature by showing the variation in characteristics that were salient at different degrees of swirl intensity. For instance, being female was significantly associated with high-intensity swirl consistent with prior research (e.g., Kearney et al., 1995; Wang & Pilarzyk, 2009) but not related to low-intensity swirl. However, the opposite was true for age and first-generation status, where we observed a significant association in the comparison between participants who did not swirl and those who engaged in low-intensity swirl. These results are congruent with prior findings (e.g., Soler, 2020; Taylor, 2016). A very modest but unique effect was found for the Pell Award, whereby it was negatively associated with low-intensity swirl but positively associated with high-intensity swirl. These results are partially congruent with Soler

and Meza (2018), who noted Pell was negatively associated with swirl. However, our parsing out of swirl intensity may contribute to our divergent findings. Across all levels of swirl intensity, we observed a positive relationship between transfer credits and swirl, indicating that credit accrual is associated with swirl. Regarding institutional structural characteristics such as college size, tuition and fees, and setting, which served as a measure of urbanicity, all showed significant associations with low-intensity swirl but not with high-intensity swirl. This indicates that low-intensity swirl was linked with enrolling in a larger college, one with higher tuition and fees, or one in an urban location. Interestingly, starting at a four-year private college significantly increased the odds of swirling across the entire spectrum, and further, starting at a public four-year college predicted engagement in high-intensity swirl, contributing to the literature seeking to disentangle sector and swirl.

Although exploration of degree completion outcomes fell outside the scope of this study, findings have implications for the acquisition of human capital. First, the presence of numerous non-linear, jagged attendance pattern paths suggests the monetary benefits associated with human capital accrual are delayed for some students. Second, prior research has established that transfer behavior inhibits degree completion (e.g., Long & Kurlaender, 2009; Spencer, 2023); therefore, for those participants exhibiting high intensity of swirl, the human capital cost-benefit analysis may be skewed. Each successive transfer and subsequent loss of credits will extend the cost and set back the accumulation of benefits. Finally, results showing multiple institutional structural characteristics were associated with swirl and show the accrual of human capital is subject to external locus of control. Caliendo et al. (2022) found that a higher internal locus of control was associated with an increase in undertaking training and education associated with human capital. Those findings underscored that a greater external locus of control may require additional support to complete training goals (Caliendo et al., 2022). Therefore, the accrual of human capital, though often perceived as an individual endeavor, is subject to external forces that include institutions of higher education and their characteristics.

IMPLICATIONS AND CONCLUSION

Recent evidence suggests that the COVID-19 pandemic further propagated online instruction and increased student movement across colleges (Bragg et al., 2020; Soler, 2020), suggesting swirl may be on the rise. Findings help to bring awareness to practitioners of the diversity and extensiveness of attendance patterns. Many current student management systems account for transfer credits, but actual attendance histories are not always readily available. Practitioners involved in records management or advising, specifically, might find it beneficial to incorporate attendance histories into learning systems so they can better comprehend the unique needs of swirling students. For instance, a student exhibiting high-intensity swirl might benefit

from a more intrusive form of advising to address underlying issues that prompt serial transfer behaviors. In addition, as institutions continue to be vexed by postsecondary enrollment challenges, understanding swirl can help colleges and practitioners devise better retention strategies. In this regard, findings highlighting that four-year entrants at public and private colleges were more likely to engage in high-intensity swirl are particularly salient for practitioners at 4-year colleges. Practitioners may want to use clearinghouse data to investigate which students on their respective campuses engage in swirl as a means for developing institution-specific retention strategies. Future studies should explore why 4-year entrants engaged in multiple transfer behaviors. Results also underscore the relevance of institutional structural characteristics in relation to swirl. These findings should prompt practitioners to more closely scrutinize which institutional factors and forces at their respective campuses may be instigating swirl behavior. For instance, our findings show that students who began at colleges situated within rural areas were less likely to swirl.

Previous studies have found that students from rural areas are less inclined to transfer, primarily due to geographical limitations and the accessibility of postsecondary opportunities (Jabbar et al., 2017). This suggests that practitioners at urban colleges may see more students swirling and may want to deploy retention strategies, such as first-year seminars or opportunities for students to connect with faculty, which has been empirically linked to retention (e.g. King & Kerr, 2005; Kuh et al., 2010; Pascarella & Terenzini, 2005). Although outside the scope of this study, future research and studies should examine institutional policies associated with swirl as a means for addressing retention gaps. Comprehension of swirl will continue to be salient in the forthcoming years as policymakers continue deliberations around the cancellation of student debt, which may potentially motivate students to re-enter higher education to finish their degrees. Additionally, as policymakers continue to increase retention standards at colleges, comprehension of swirl will remain crucial.

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