A Longitudinal Study Examining the Role of Social Connectedness in the Course of Depressive Symptoms: An Evaluation of Transfer and Freshman Students

by

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Abstract

Students face many stressors during their transition to a new postsecondary academic institution (e.g., meeting new people, adjusting to a new lifestyle, etc.). The purpose of this study was to examine how college transition influences the development of depressive symptoms during students' first semester of college. Our primary hypothesis was that transfer students would score higher in depressive symptoms than freshmen, and that social connectedness would mediate the relationship between freshman-transfer status and the level of depressive symptoms. Linear mixed modeling was used to evaluate how well our proposed variables predict depressive symptoms. Results show that transfer students, on average, scored higher in depressive symptoms than freshman students before and during the semester. They also scored lower in social connectedness, which, when included in the model, attenuated the relationship between freshman-transfer status and depressive symptoms, providing support for the mediation model. The difference between level of depressive symptoms and social connectedness between transfer and freshman students is discussed in terms of policy making implications.

Keywords: transfer students, depression, social connectedness, college transition, mediation

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A nationally representative study conducted in the United States found that the lifetime prevalence rate of major depressive disorder is 16.6%, highest among all psychiatric disorders listed in *DSM-IV* (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005). Depression is one of the leading causes of disability in the world. It is the second leading cause of productive life lost due to disability among the 15-44 age group (World Health Organization, 2010). In other words, the high prevalence rate of depression is a serious problem with significant societal costs.

In addition to societal costs, depression also has serious personal and interpersonal consequences. It is associated with impairments in many areas of functioning, such as self-care, work and academic performance, and leisure activities (Lewinsohn, Seeley, Roberts, & Allen, 1997). People with depression are more likely than others to adopt risky health behaviors, including binge eating (Glied & Pine, 2002) as well as alcohol and drug abuse (Conner, Pinquart, & Gamble, 2009) . Depressive symptoms also impair social functioning, adjustments (de Lisio, Maremmani, Perugi, & Cassano, 1986; Gorenstein, et al., 2002), and are associated with lower cognitive functioning (Kovacs, & Goldston, 1991). Moreover, depression confers risk for suicidal ideation (Glied & Pine, 2002; Lewinsohn, Clarke, Seeley, & Rohde, 1994; Lewinsohn, Rohde, & Seeley, 1996) and suicide attempts (Nordström, Åsberg, Åberg-Wistedt, & Nordin, 1995).

By definition, depressive disorders, like major depressive disorder, cause distress or interfere with daily life activities. However, even when depressive symptoms are not severe enough to warrant a depression diagnosis, they can be damaging. Subsyndromal depression, a term used to describe symptoms of depression that do not meet full criteria for a depressive

disorder, is related to various health problems and suicidality (Judd, Akiskal, & Paulus, 1997) and causes impairment in the quality of life (da Silva Lima, & de Almeida Fleck, 2007). The prevalence rate of subsyndromal depressive symptoms was 12.9% in a representative study of the Australian population (Goldney, Fisher, Dal Grande, & Taylor, 2004). Given the high prevalence rate and harmful consequences of subsyndromal depression, researchers emphasize the importance of considering the continuum between the sub-clinical and clinical depression (Judd et al., 2000). It is therefore important to note that we are referring to both depressive disorder as well as sub-clinical depressive symptoms when we use the word "depression."

Late adolescence and early adulthood are critical in the etiology of depression. Depression rates are low during childhood and early adolescence (1-3%) but the rates increase approximately six fold during late adolescence (up to 17%), and remain stable in adulthood (Hankin, 2006). Depressive symptoms during adolescence also strongly predict major depression episodes in adulthood (Pine, Cohen, Cohen, & Brook. 1999).

The prevalence rate of depression in this age group is alarming. In a national study of students from 57 postsecondary institutions, 30% of respondents reported feeling so depressed that it interfered with their functioning at some point during the previous year (American College Health Association, 2009). Another study found that 12.9% and 15.4% of students in a large, public university screened positively for a depressive disorder in 2005 and 2007 respectively (Zivin, Eisenberg, Gollust, & Golberstein, 2009). In a nationally representative study of the young adult population conducted by the U.S. Census Bureau, the 12-month prevalence of major depressive disorder was 7.04% among those attending college and 6.67% among those not attending college (Blanco et al., 2008).

Depression is associated with negative consequences in academic settings. Studies have shown that depressive symptoms are linked to poor academic performance (Andrews & Wilding, 2004; Fröjd et al., 2008; Glied & Pine, 2002; Hysenbegasi, Hass, & Rowland, 2005). A large-scale longitudinal study found that depression is a risk factor for dropping out of college (Eisenberg, Golberstein, & Hunt, 2009). Another study found that major depression is related to failure to graduate from college, although the relationship disappeared when sociodemographic variables were controlled (Hunt, Eisenberg, & Kilbourne, 2010).

The transition to college may be a time of increased risk for depressive symptoms. "Transitions usually mean the reconstruction of relations between the person and environment, which may put individuals under pressure" (Tao, Dong, Pratt, Hunsberger, & Pancer, 2000, pp. 123). As suggested by the diathesis-stress models, some people have underlying vulnerabilities (a diathesis) that put them at increased risk for depression (Abramson, Metalsky, & Alloy, 1989). However, the diathesis is only believed to increase risk in the presence of a trigger or a stressor (e.g., negative life events). Previous research has found that transition to college is an acute, short-term stressor (instead of a chronic or long-term one) that strains students mainly upon entry to university (Gall, Evans, & Bellerose, 2000). Acute stress is a consistent predictor of the onset of depression (Brown & Harris, 1989; Gotlib & Hammen, 2010). Therefore, it would be reasonable to expect that college transitional stress could trigger depressive symptoms. Not surprisingly, evidence shows that the stress of entering college intensifies the negative effects of prior major events and increases students' vulnerability to depression (Compas, Wagner, Slavin, & Vannatta, 1986). Many studies have also found that stress correlates with (e.g., Banez & Compas, 1990; Lin, Probst, & Hsu, 2010) and predicts depression (e.g., O'Connor, Rasmussen, & Hawton, 2010). Therefore, the stress that accompanies the transition to college may have a

substantial impact on students' mental health, which may subsequently contribute to academic problems (Wintre & Yaffe, 2000).

Transitioning to college is difficult for many students. First-year students face many new challenges, such as relocation, meeting increased academic demands, forming new social networks, and separation from family and friends (see Lee, Olson, Lock, Testa, & Odes, 2009). Among this population is a group of students who are often overlooked by policy makers – the transfer students. This population is worth understanding not only because they are going through a unique transitioning process that might expose them to greater risk, but also because the number of transfer students is increasing (Laanan, 2004). From 2003 to 2004, the National Center for Education Statistics of the U.S. Department of Education estimated that the national number of transfer students is approximately 19.2% (U.S. Department of Education, National Center for Education Statistics, 2003-04). Transfer students also make up a significant portion of the University of Michigan student population. In the fall 2009 and winter 2010 semester alone, 1,210 new transfer students enrolled at the University, making up 19.9% of the new student population (Office of the Registrar, University of Michigan, 2009, 2010).

Given the increasing number of transfer students in recent years, more research is needed to understand the impact of transferring on psychosocial functioning. Considerable amount of research has been done to evaluate the impact of transferring on students' academic performance (e.g., Gawle & McGowan, 2006; Keeley & House, 1993). These studies have found that transfer students experienced a temporary drop in academic performance in the first semester in a new institution, which is known as the "transfer shock" (Anderson, & Polillo, 1988; Cejda, 1997; Hills, 1965; Keeley & House, 1993). However, little research has been done to examine the role mental health plays in this phenomenon (Laanan, 2004). In his attempt to study this trend,

Dougherty (1994) has summarized studies showing that first-year transfer students face more financial challenges and more social pressure than freshman students. This includes fewer chances to live on campus due to the priority for freshman students, difficulty in getting financial aid, and the need to work to support themselves. These external stressors lead to less time or opportunities to socialize and join student activities. Transfer students being interviewed in a study mentioned that the bigger classroom sizes and student body compared to their previous colleges might explain why transfers students would feel frustrated by the difficulties of forming friendships (Townsend & Wilson, 2006). The same study also suggested that the age gap between transfer students and other new students might hinder transfers students' social integration. Moreover, transfer students reported lower levels of perceived availability of certain social resources than freshmen and traditional students of the same year (Belvedere, 2000). These studies suggest that transfer students may be exposed to unique sources of stress making their transition particularly challenging, which could increase their risk of developing depressive symptoms (Kendler, Karkowski, & Prescott, 1999).

A lack of involvement and quality social relationships could be problematic when students are already vulnerable to mental health problems during college transition. A study specifically designed to understand first-year students' college transition found that social support helped students to manage their academic stress (Rayle & Chung, 2007), which is a significant predictor of depression (Ang & Huan, 2006). Social support may also serve as a protective factor against the negative effects of stressful events on depressive symptoms or moderate the relationship between them (Henrich & Shahar, 2008; Lin, Probst, & Hsu, 2010; Yang, et al., 2010). Related research has also shown that social competence and social skills

reduce risk for depression (Ross, Shochet, Bellair, 2010; William & Galliher, 2006). To put it briefly, good social relationship is an important buffer against vulnerability to depression.

Social connectedness is another construct commonly used in recent psychology research. It is defined as an individual subjective evaluation of the degree of closeness between the self and the community. Studies have found that social connectedness is a mediator between depression and social skills, competence, and support (Ross, Shochet, & Bellair, 2010; William & Galliher, 2006). These findings suggest that social connectedness may have a better proximity in predicting depression. It could also be a mechanism through which social support and social competence lead to depressive symptoms. Accordingly, given that studies have suggested that transfer students have fewer opportunities to form social relationships (Belvedere, 2000; Dougherty, 1994; Townsend & Wilson, 2006), they could be at a greater risk of developing depressive symptoms.

Goals and hypotheses

The present study has two major goals. The first goal is to evaluate whether incoming transfer and freshman students differ in their levels of depressive symptoms. The second goal is to test hypotheses regarding variables that contribute to depressive symptoms. Based on the background literature, we have generated five hypotheses.

(i) Incoming freshman and transfer students will report an increase in depressive symptoms during the first semester at the University of Michigan due to the stress of college transition. This is based on the literature that suggests that transition to college is an acute stressor (Gall, Evans, & Bellerose, 2000), and that negative, acute events consistently predict the onset of depression (Brown & Harris, 1989).

(ii) Incoming transfer students will have higher levels of depressive symptoms before entering the university than will incoming freshmen. This hypothesis is based on the premise that transfer students typically have more stressors than freshmen before the start of their first academic semester at a new institution (Dougherty, 1994). For instance, they might have more financial responsibilities and less technical support from the university during the transfer process (Dougherty, 1994)

(iii) Incoming transfer students will have higher levels of depressive symptoms throughout their first semester at the university than will incoming freshmen. This hypothesis is based on the fact that transfer students face unique stressors and perceive less social support than traditional students (Belvedere, 2000; Dougherty, 1994). We expect that this combination of increased stress and less social support will make it more difficult for transfer students to develop a sense of connectedness and will increase risk for depressive symptoms during the first semester.

(iv) Social connectedness will mediate the relationship between transfer status (freshman or transfer) and depressive symptoms. The statistical analyses of the mediation model will be described in the method section.

(v) High baseline levels of depressive symptoms will impede the development of strong social connections (i.e., students with high levels of pre-semester depressive symptoms will report lower levels of social connectedness during the transition process). The hypothesis is based on previous studies that suggested that depression impairs social functioning and adjustments (de Lisio, Maremmani, Perugi, & Cassano, 1986; Gorenstein, et al., 2002).

Potential contribution of this study

Since most studies that aimed to examine the relationship between college transition and depressive symptoms adopted cross-sectional design, the longitudinal design of this study will help further explain this psychological phenomenon. In addition, since very little literature examines the impact of transferring on transfer student well-being, this study would help us better understand how transfer students adjust to a new college environment in terms of their mental health. It will also offer insight to understand who is at risk for developing depression during college transition, which would help practitioners to improve their prevention and early intervention strategies in the future.

Method

Participants

This study was open to students who were 18 years of age or above. The recruitment of participants began in August, 2010. The research team, in collaboration with the Registrar's Office of the University of Michigan, sent emails to a random sample of 3,200 new freshmen and transfer students which included a brief introduction and a consent form to invite them to participate in the study. A total of 305 participants provided consent to participate in the study but only 283 (93%) completed the demographic information sheet and completed at least one assessment. These 283 participants were included in the study analyses. Among our sample, 32.16% were transfer students and 67.84% were freshman students (171 female, 112 males, M_{age} = 18.8, age range: 18-41 years) (see Table 1 for additional demographic information).

Assessments

Participants completed five online assessments through *Qualtrics*, an online survey software. The first questionnaire assessment took place during August 2010 and there was one

additional assessment during each month of the academic semester. Detailed information regarding the number of participants in each assessment is outline in Table 2 and 3.

Measures

Patient Health Questionnaire (PHQ-8; Kroenke & Spitzer, 2002). The PHQ-9 is a well –validated instrument measuring depressive symptoms both in clinical settings and in research (Kroenke, Spitzer, & Williams, 2001). This scale prompts participants to rate the extent to which they experienced the nine core symptoms of major depression defined in the DSM-IV-TR over the previous two weeks on a Likert scale from 0 (not at all) to 3 (nearly everyday). The validity of the scale has been established in several large-scale studies (Kroenke & Spitzer, 2002; Kroenke, Spitzer, & Williams, 2001). The test-retest reliability is high, with a correlation of .84 over a 48-hour period(Kroenke, Spitzer, & Williams, 2001). The internal reliability of PHQ-9 is also high, with a Cronbach's α of .89 and .86 in two studies (Kroenke, Spitzer, & Williams, 2001). Kroenke and Spitzer (2002) suggested using an 8-item version of the questionnaire (PHQ-8), omitting an item that probes for suicidal ideation, when using the questionnaire in community studies when suicidal risk is low. The sensitivity and positive predictive value of the PHQ-8 and PHQ-9 were similar at each depression severity level.

Social Connectedness Scale—Campus Version (SCS-C; Lee & Davis, 2000). The original SCS was developed by Lee and Robbins (1995) to measure the extent to which an individual feels close to his or her social world and the difficulty to maintain the interpersonal closeness. The SCS-C is a 14-item questionnaire adapted to measure the same construct in the context of college campus (Lee, Keough, & Sexton, 2002). This scale contains six positively worded and eight negatively worded items rated on a scale from 1 (strongly disagree) to 6 (strongly agree) scale. Higher scores represent higher social connectedness on campus. This

scale has been used to measure social adjustment among college students with a sample size of over 200 students (Lee, Keough, & Sexton, 2002). The internal reliability (α = .91) and the test-retest reliability over a two-week interval (r = .96) of this scale were high. The scale was also significantly correlated with social appraisal (Lee, Keough, & Sexton, 2002).

Demographics. Participants provided basic demographic information: sex, transfer status (i.e., whether or not the student transferred to the university), past financial situation, current financial situation, parent education, religiousness, and race. Table 1 provides a summary of participant demographic characteristics.

Statistical Analysis

Preliminary Analyses. We evaluated the normality and outliers of our major predictor and outcome variables using boxplots and quantile-quantile plots. There were no clear violations of normality or outliers in the SCS total scores. However, the PHQ-8 total scores were skewed in a positive direction—with most students endorsing few, if any, depressive symptoms—and there were a considerable number of outliers with scores at least 1.5 *SD*s above the mean. Accordingly, we transformed the data using a natural log function to make the PHQ-8 scores better conform to a normal distribution.

Primary Outcome Analysis. Our primary analyses were conducted using SPSS for Windows, Release Version 17.0.1, (© SPSS, Inc., 2001, Chicago, IL, www.spss.com). Linear Mixed Modeling (LMM) was used to examine the course and predictors of depressive symptoms over time. This method was chosen over general least squares regression for several reasons. Regression assumes three criteria: normality, constant variance, and independence (Rao, Shalabh, Toutenburg, Heumann, 2008). Since our data are longitudinal and each individual was assessed repeatedly, the independence assumption seemed implausible given that participants' responses

at a given time point are not independent of their responses at other time points (Fitzmaurice, Laird, & Ware, 2004). LMM relaxes this assumption. The LMM procedure allows the analyst to include random intercept terms (which model variability in the outcome measure at the intercept) and random slope terms (which allow individual trajectories to change at a different rate over time). In addition, this approach enables participants who missed assessments to remain part of the analyses (Snijders & Bosker, 1999).

Restricted maximum likelihood (REML) estimation was used to estimate model parameters. The data of our study have a two-level structure, with level 1 being the longitudinal, time-varying measurements and level 2 being the unchanging characteristics of the participants. Level 1 variables were meant to capture within-subject variance, while Level 2 factors were included to capture between-subject variance (see Table 4 for the list of level 1 and 2 variables).

Our data analyses followed a model comparison approach, which means we compared a simpler model (typically representing the null hypothesis) to a more complex one (typically representing the alternative hypothesis), with the goal of finding a well-fitting but parsimonious model. We first ran a general least squares model (with no predictors and only a fixed intercept term) that served as a baseline for our model comparison approach. We predicted that an empty LMM model (i.e., an LMM model with only a fixed and random intercept term) would be a better fit to our data compared to the general least squares model. In each of the following steps, we created a more complex model that included more parameters and compared it to the simpler model created in the previous step. We added parameters in the following sequence: time-varying factors, interactions of time-varying variables, time-invariant factors, and interactions between time-varying and time-invariant factors. If the complex model better fit the data than the

previous model, the added parameter(s) were retained in the next model (West, Welch, & Galecki, 2007).

We used three methods to evaluate how well the competing models fit our data. First, likelihood ratio tests (LRT) were conducted to determine whether the fit of the complex model was significantly better than the simpler model (West & Welch, 2007). LRTs require the competing models to have equal numbers of cases. Therefore, when the complex model had more missing data than the simple model, we excluded the cases from the complex model to create equal sample sizes between the two models. Second, we evaluated each model based on its Akaike Information Criterion (AIC) score, which estimates how well the model fits the data while penalizing the analysts for adding parameters (West & Welch, 2007). This is important because with large sample sizes, parameters with a small effect could be significant. Therefore, AIC would serve our purpose of finding a well-fitting but simple model. The third tool we used to evaluate our model fit is to test the significance of each individual fixed-effects parameter using a *t*-test.

Mediation Analyses

We predicted social connectedness would mediate the relationship between transfer status and depressive symptom scores. We conducted mediation analyses based on the procedures described by Baron and Kenny (1986). In order to establish mediation, the following criteria must be fulfilled. First, there has to be a significant relationship between the independent variable (IV) and dependent variable (DV). Second, there must be a significant relationship between the IV and the mediator. Third, there must be a significant relationship between the mediator and the DV. Finally, the relationship between the IV and DV must become less strong when the mediator is included in the model.

Results

Preliminary Findings

Welch's two-sample *t*-tests were conducted to compare whether transfer students scored higher in PHQ-8 and lower in SCS than freshman students. Different from a traditional independent sample *t*-test, the Welch's *t*-test was designed to compare samples with possible unequal variances (Welch, 1947). Table 2 has outlined the PHQ-8 scores of freshman and transfer students in all five of the assessments, and Table 3 shows the SCS scores of these two groups in four assessments (it was not measured in the first, pre-semester assessment). We calculated effect sizes by dividing the difference in means of freshman and transfer students by the pooled standard deviation (Cohen, 2003). In all of the assessments, transfer students consistently scored higher in depressive symptoms, although the effect sizes were only small to medium (*d*s = -0.20 to -0.37) (Cohen, 2003), with a trend of decreasing magnitude of difference between the two groups (see Table 2 for the means, standard deviations, and effects sizes of the differences between the two groups of students, and Figure 1 for the development of depressive symptoms of freshman and transfer students). Consistent with our hypothesis, transfers students also scored lower in SCS in all four assessments (see Table 3) with medium effect sizes (*d*s = -0.49 to 0.63) (Cohen, 2003). Figure 2 also graphically outlined the trends of SCS throughout the semester.

Linear Mixed Modeling Analyses

A brief summary of our model comparison analyses is outline in Table 5. Results show that the empty LMM model is a better fit for our data than the general least squares model, suggesting that the LMM approach is a better way to analyze our data. Therefore, we used LMM rather than GLS analyses in all subsequent analyses.

To examine whether the level of depressive symptoms before entering college impede the development of social bonds, we first set SCS as the outcome variable. The fixed effect of Time was a positive and significant predictor of SCS, $t(772) = 2.40$, $p = .02$, meaning that SCS scores tended to be higher as the semester progressed. We then added the baseline depressive symptom scores as a predictor of SCS during the semester. Baseline symptoms were a significant predictor of SCS scores during the semester, $t(269) = -6.34$, $p < .01$, meaning that students who scored higher in depressive symptoms before entering the university tended to score lower in social connectedness in their first semester in the university.

Our next step was to evaluate whether our time-varying predictor variables (Time and SCS) were significant predictors of depressive symptoms. There was a significant, positive relationship between Time and PHQ-8 scores, $t(771) = 3.86$, $p < .01$, indicating that mean depressive symptoms scores increased over the course of the semester. There was also a negative and significant relationship between SCS and PHQ-8 scores, $t(771) = -9.89$, $p < .01$, meaning that students who scored higher in social connectedness tended to have lower levels of depressive symptoms.

The interaction between these time-varying variables (Time x SCS) was then added to the model. The interaction was significant, $t(770) = 2.31$, $p = .02$, which means that the relationship between social connectedness and depressive symptoms changes over time. In order to better understand the nature of this interaction, we conducted correlations between social connectedness and depressive symptoms at each time point. We found that the strength of the relationship between SCS and PHQ-8 tended to be higher at the beginning of the semester, meaning that the effect of social connectedness on depressive symptoms tended to decrease over the course of the semester.

Our next step was to add time-invariant factors (representing unchanging participant characteristics) to the model. Transfer Status was first added to the model. This variable was not a significant predictor of PHQ-8 scores when controlling for the effects of the time-varying variables (Time and SCS), $t(269) = .05$, $p = .96$. We also wanted to examine whether transfer students show greater increases in symptoms over time compared to freshmen. Therefore, we added the interaction of Time and Transfer Status to the next model. No significant interaction between Transfer Status and Time was found, $t(1046) = -1.42$, $p = .16$, meaning the transfer students tend to have similar patterns of development in depressive symptoms as freshman students over the course of the semester.

We next added the level-2 time-invariant demographic variables (i.e., Race, Sex, Religiousness, Current Financial Situation, Past Financial Situation, and Parent Education) in the model to examine whether these factors predict depressive symptoms or moderate the effect of Transfer Status on depressive symptoms. None of these factors were significant predictors of PHQ-8 scores. Adding these factors also did not improve model fit, $\chi^2(17) = 21.07$, $p = .22$.

Mediation Analyses

Following the procedure described by Baron and Kenny (1986), we evaluated whether there was a significant relationship between Transfer Status and PHQ-8 scores, and whether SCS mediated this relationship.

Significant relationship between the IV and DV. We first tested whether Transfer Status (the IV) was a significant predictor of PHQ-8 scores (the DV) when SCS (the mediator) was not included in the model. As predicted, transfer status was a significant predictor of depressive symptoms, with transfer students scoring significantly higher in depressive symptoms than freshman students, $t(281) = 2.27$, $p = .02$. Thus, the first criterion of the mediation model

was established. We also tested whether the relationship between Transfer Status and PHQ-8 scores (with SCS removed from the model) would remain significant when controlling for demographic factors. After adding Sex, Race, Parent Education, Past Financial Situation, and Current Financial Situation to the model, the effect of Transfer Status remained marginally significant, $t(254) = 1.77$, $p = .08$. This suggests that demographic factors cannot fully explain why transfer students tended to score higher in depressive symptoms.

Significant relationship between the IV and mediator. We next constructed a model with SCS as the DV and Transfer Status as the IV, in order to establish the second criterion of the mediation model. Transfer Status was a significant predictor of SCS, $t(1044) = -5.27$, $p < .01$, with transfer students reporting lower levels of social connectedness than transfer students.

Significant relationship between the mediator and DV. As previously noted in the section describing the LMM section, there was a significant negative relationship between SCS and PHQ-8 scores, which fulfills the third criterion of mediation. As expected, students with higher levels of social connectedness reported lower levels of depressive symptoms.

Attenuation of the IV-DV relationship in the presence of the mediator. Finally, we evaluated the relationship between Transfer Status and PHQ-8 scores while including SCS as a covariate. As described above, the relationship between Transfer Status and PHQ-8 scores was not significant when SCS was included as a covariate, $t(269) = .00$, $p = .96$ (see Figure 3). This shows that SCS is attenuating the relationship between the IV, Transfer Status, and the DV, PHQ-8. Taken together, these 4 criteria suggest that social connectedness is a full mediator of the relationship between transfer status and depressive symptoms.

Discussion

The results of our study are generally consistent with our hypotheses. First, there was an increase in the level of depressive symptoms scores in both transfer and freshman students during the first semester. Second, transfer students had higher symptoms before entering college. Third, when compared to freshmen, transfer students also tended to have higher depressive symptoms throughout their first semester at the university. Fourth, our mediation hypothesis was supported, with social connectedness fully mediating the effect of transfer status on depressive symptoms (see Figure 3). Lastly, students who had higher pre-semester levels of depressive symptoms tended to score lower in social connectedness during the semester.

There are various ways to interpret our findings. First of all, the fact that both freshman and transfer students scored higher in depressive symptoms as the semester progressed could be attributable to the stressful college transition process that put students at risks of developing depressive symptoms (Compas, Wagner, Slavin, & Vannatta, 1986). Consistent with our hypothesis, transfer students scored higher in pre-semester depressive symptoms than freshman students, meaning that transfer students are at risk before the academic semester begins. Our study cannot address the reasons why transfer students come in with higher levels of symptoms. This may be due to having more anxiety and stress as a result of the lack of support from the new university (Townsend & Wilson, 2006) or reasons why they left the previous school. Transfer students also scored significantly higher in depressive symptoms than freshmen during the semester, which was explained by the lower levels of social connectedness in this sample. Another finding is that students who have higher levels of pre-semester depressive symptoms tended to score lower in social connectedness. The relationship between pre-semester depressive symptoms and social connectedness might give support to previous literature that suggests

depressive symptoms impede the development of social relationship (de Lisio, Maremmani, Perugi, & Cassano, 1986; Gorenstein, et al., 2002).

The study also provided interesting secondary findings. For instance, there was a significant interaction between time and social connectedness. Further analyses show that the strength of the relationship between social connectedness and depressive symptoms slightly declined over the course of the semester, implying that the magnitude of the effect of social connectedness on depressive symptoms became smaller as the semester progressed. Perhaps after a certain time point of the initial college transitioning process, social connectedness might not play as important a role as a buffer. However, futures studies would be needed to address why the relationship between social connectedness and depressive symptoms declined over the course of the semester, and how stress might play a role in this relationship.

Additionally, no significant interaction between time and transfer status was found, which implies that transfer and freshman students, although entering college with different levels of depressive symptoms, have similar development over the semester. In other words, the gap already existed before the semester started and did not widen during the semester (see Figure 1). Therefore, the difference during the semester could be attributable to the preexisting levels of depressive symptoms instead of the differential experience between the two groups of students after they entered the university.

In addition, transfer status remained a marginally significant predictor of depressive symptoms when controlling for participant demographic characteristics. This suggests that transfer status is a unique contributing factor to the course of depressive symptoms that cannot be explained by other demographic factors.

Limitations

Certain limitations of the study should be considered for interpretation of findings. One major concern about our study is that we did not account for potential moderators. In particular, the effect of international student status was not controlled. There was a large amount of overlap in the transfer status and international student status variables (multi-collinearity), with many transfer students and few freshmen identifying as international students (41% vs. 6%, respectively; see Table 1). Therefore, we were not able to control for international students status. We also did not include housing status as a moderator because virtually all freshmen lived on-campus and the majority of the transfer students lived off-campus (see Table 1). However, a previous study (Brunwasser, 2009) found that differences between freshmen and transfer students on depressive symptoms may be attributable to differences in housing placement. Besides, this study did not examine whether stress and social connectedness with family members or people outside of the school community made a difference in the course of depressive symptoms. These are factors that future studies should consider.

Another limitation is the fact that our study is based on a convenience sample of university students. It is unclear whether the findings from this study would generalize to the larger population of undergraduate students in the U.S. Another factor that might hinder the external validity is the fact that our sample is collected in a large, public university in which students might have more difficulties connecting to others than at smaller academic institutions. Therefore, our result might not generalize to smaller college campuses in which students may be more inter-connected, and consequentially, there may be less variability in levels of social connectedness.

Although the study is longitudinal, the data are still limited to the first semester of college transition. Therefore, even though we see an increase in depressive symptoms throughout the

semester, a longitudinal study that extends over a semester would be needed to see if this trend is limited to the first semester of college.

Furthermore, this study is relied on self-report questionnaires, which may be subjected to self-report biases. Future research could improve the study design by supplementing the self-report measures with non-self-report instruments. For instance, it would be more objective to evaluate social connectedness of students through reports of others or to use institutional data such as the grade point averages of students.

Implications

The findings of our study are consistent with a large body of research that shows social relationship plays a role in the development of depression (e.g., Lin, Probst, & Hsu, 2010; Sax, Bryant, Gilmartin, 2004; Yang et al., 2010). This left us with a curious question: why is social connectedness such a crucial factor in reducing the risk for depressive symptoms among new students? Some studies examining the relationship between social relationship and happiness might help explain this phenomenon. Being socially connected might mean that students have more social support that can buffer the college transitional stress (Lin, Probst, & Hsu, 2010; Yang, et al., 2010). In addition, while friendship quality is a significant predictor of happiness (Demir & Weitekamp, 2007), the positive emotions people found in interpersonal relationships might help build resilience and facilitate coping when faced with adversities (Fredrickson, 2001).

Future Directions

Given that transfer students tend to have higher depressive symptoms before and during the semester, more support might be needed for this population. Fortunately, social connectedness is a protective factor of depressive symptoms that has high malleability. Although more research (both qualitative and quantitative) would be needed to understand why transfer

students tend to have higher depressive symptoms and lower social connectedness, some previous studies suggested that they reported lower levels of perceived availability of social resources (Belvedere, 2000), had fewer chances to live on-campus and to receive financial aid (Dougherty, 1994; Townsend & Wilson, 2006), and had heavier financial burden than their freshman counterparts (as seen in Table 1). Accordingly, policy makers of universities should consider providing transfer students with opportunities that help alleviate their financial burden and to get connected to campus. This could be programs that help transfer students to find on-campus jobs or help transfer students get involved in campus activities.

Conclusion

Our study has demonstrated several interesting phenomena. First, the levels of depressive symptoms increase during the college transition. Second, depressive symptoms impair the formation of social connections during this transition. Third, transfer students appear to be at increased risk for depressive symptoms. And lastly, the increased risk during the semester appears to be largely the result of having lower levels of social connectedness. The overall findings of our study suggest that social connectedness is an important protective factor for depressive symptoms and policy makers of universities should therefore consider providing more opportunities for new students to form connections on campus.

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Table 1

Demographic characteristics of the 283 participants who completed at least 1 assessment.

		Freshman	Transfer		
Measure		*N*	*N*	χ^2 *(df)*	*p*
Sex	Male	76	36	0.00(1)	.99
	Female	116	55		
Housing	Dorm with a roommate	176	23	711.71(6)	.00
	Dorm without a roommate	6	5		
	Sorority/ fraternity houses	1	0		
	Cooperative House	1	5		
	With parents	3	9		
	Off campus with roommate	4	41		
	Off campus without roommate	1	8		
International	Yes	11	26	146.67(1)	.00
	No	181	63		
Parent education	Some HS/ less	3	1	32.53(5)	.00
	HS grad	16	6		
	Some college	15	10		
	College grad	56	37		
	Post college degree	100	35		
	Other	2	2		

Past financial situation	Very poor	1	2	90.66(3)	.00
	Had enough but not extras	32	33		
	Comfortable	119	48		
	Well to do	40	8		
Current financial situation	Financial struggle	27	16	79.85(2)	.00
	Tight but doing fine	95	62		
	Not a problem	70	12		
Race	Asian	36	31	15.82 (6)	.01
	African	7	1		
	Hispanic	2	2		
	Caucasian	136	48		
	Middle Eastern	1	3		
	Multiracial	6	5		
	Refuse to answer	4	1		
Religiousness	Very religious	16	9	3.39(3)	.34
	Fairly religious	57	28		
	Not too religious	62	26		
	Not religious at all	54	22		

Table 2

Means and standard deviations of PHQ-8 scores and the effect sizes of the differences between freshman and transfer students in five assessments.

	Freshman		Transfer				
Time	*N*	*M*	*N*	*M*	*Mean difference*	*Pooled SD*	*d*
August	192	3.33	91	4.78	-1.45	3.9	-0.37
September	184	3.83	86	4.86	-1.03	3.95	-0.26
October	180	4.49	85	5.88	-1.39	4.42	-0.31
November	176	4.47	81	5.36	-0.89	4.21	-0.21
December	175	5.13	81	6.14	-1.01	5.05	-0.20

Table 3

Means and standard deviations of SCS scores and the effect sizes of the differences between freshman and transfer students in four assessments.

	Freshman		Transfer				
Time	*N*	*M*	*N*	*M*	*Mean difference*	*Pooled SD*	*d*
September	184	64.84	86	56.95	7.89	14.40	0.55
October	180	66.40	85	56.93	9.47	15.13	0.63
November	172	65.70	81	58.58	7.12	14.47	0.49
December	175	67.06	81	59.54	7.52	14.53	0.52

Table 4

Level 1 and 2 covariates.

Category	Variables
Level 1	Time
	SCS
	PHQ-8
Level 2	Sex
	Transfer status
	Housing
	International
	Parent education
	Past financial situation
	Current financial situation
	Race
	Religiousness

Table 5

Summary of Linear Mixed Modeling Procedure Predicting PHQ-8

	Model 3	Model 5	Model 11
Fixed Effects	Estimate (SE)	Estimate (SE)	Estimate (SE)
β_0 (Intercept)	2.80 (.18)**	1.25 (.05)**	2.80 (.19)**
β_1 (time)	-.03 (.02)	.02(.00)**	-.03 (.02)
β_2 (SCS)	-.02 (.00)**		-.02 (.00)**
β_3 (transfer)		.20 (.09)*	.00 (.08)
β_4 (time*SCS)	.00 (.00)*		.00 (.00)*
Model Information	Estimate	Estimate	Estimate
AIC	2077.29	2167.18	2121.33

Note. *$p < .05$. **$p < .0001$

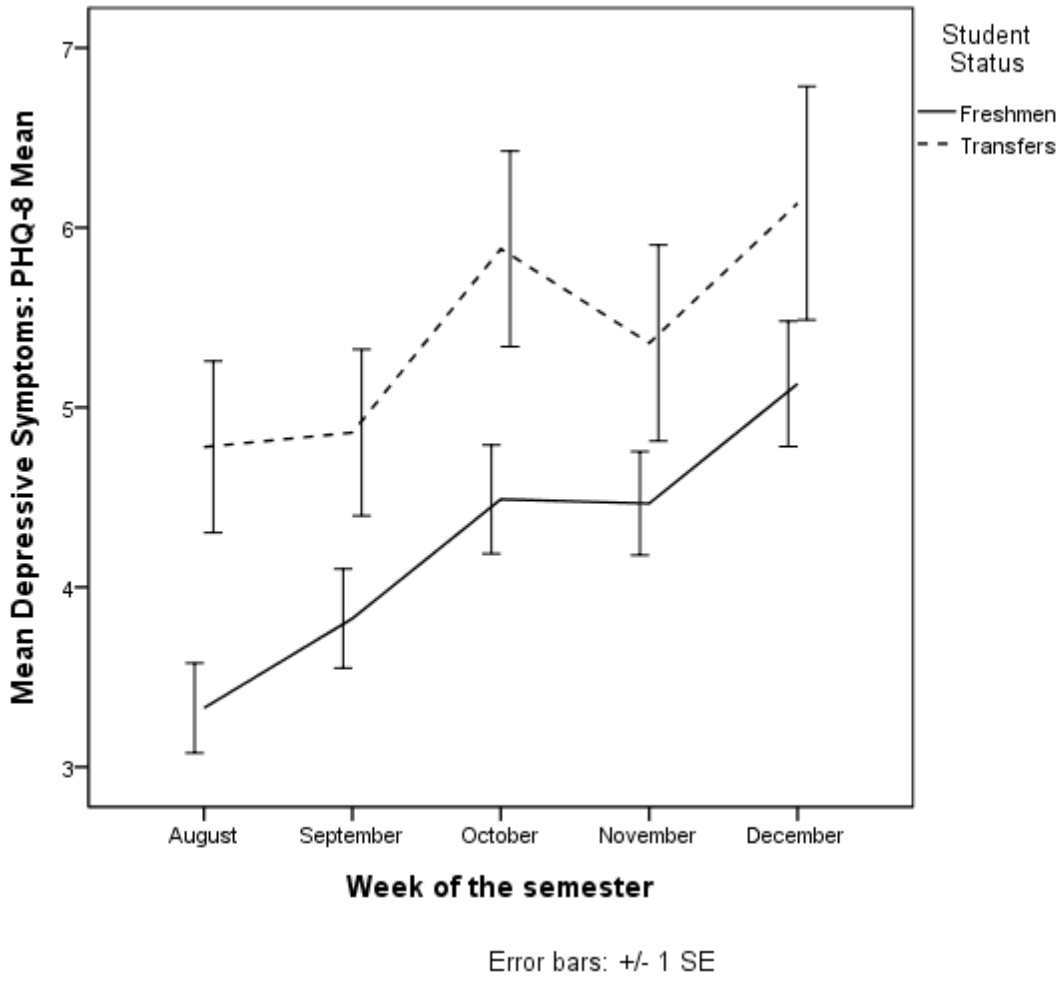

Figure 1. The differences between transfer and freshman students in PHQ-8 scores at five different time points. The graph shows that both freshman and transfer students showed an increase in depressive symptoms as the semester progressed. In addition, transfer students scored consistently higher than freshman students in depressive symptoms but the magnitude of difference tended to decrease over time.

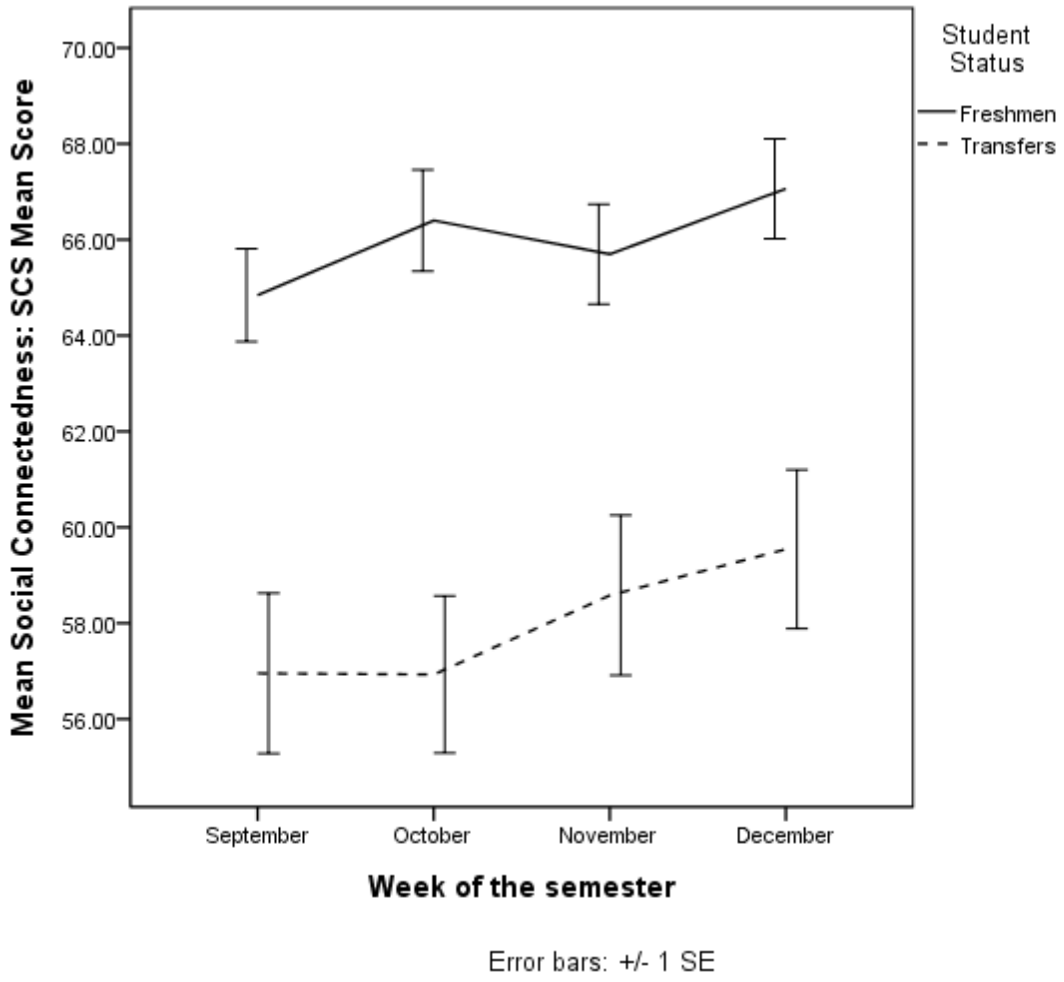

Figure 2. The graph shows the difference of social connectedness between freshman and transfer students. The differences between the two groups were significant in all four assessments.

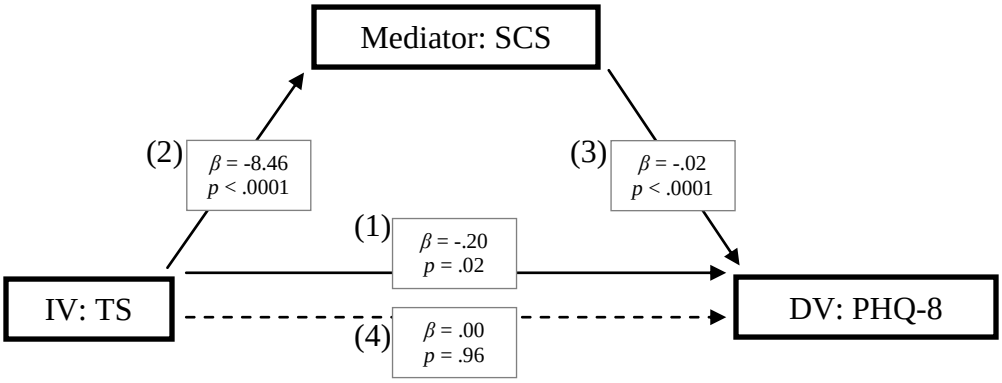

Figure 3. The four criteria for the mediation model (Baron & Kenny, 1986). (1) A significant relationship between the independent variable (IV) and dependent variable (DV). (2) A significant relationship between the IV and the mediator. (3) A significant relationship between the mediator and the DV. (4) The relationship between the IV and DV must become less strong when the mediator is included in the model.