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Differences between Traditional, Transfer, and Online College Students: Measurement  
Invariance of the University Attachment Scale

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### **Abstract**

School attachment has received considerable attention in K-12 literature but it is relatively unexplored at the post-secondary level. The university attachment scale (UAS) is a new instrument designed to bridge this gap and previous research suggests transfer students score lower on group attachment than non-transfer students. However, these findings are limited to a population of primarily residential and traditional 4-year university students. This study re-examines the factor structure of the UAS at an institution with a large transfer student population and compares the latent means between traditional ( $N = 561$ ), transfer ( $N = 372$ ) and online ( $N = 50$ ) students. These results of this study and their implications for higher education are discussed.

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School attachment theory has received considerable attention in recent years within K-12 educational literature. Grounded in the work of Ainsworth and Bell (1970) and Bowlby (1969; 1973), attachment theory refers to the bond or relationship between a child and his or her caregiver. As a child enters school, this relationship extends to teachers and peers and is positively related to academic achievement, academic self-efficacy, intrinsic motivation, and educational success (Anderman & Anderman, 1999; MacKay, Reynolds, & Kearney, 2010; Osterman, 2000).

Despite the connections identified within primary and secondary education, attachment is often ignored at the post-secondary level in favor of models focusing on college student involvement and engagement (Astin, 1993; Pascarella & Terenzini, 2005). This is likely a function of the historical and theoretical importance of autonomy and independence in college student development (Wartman, & Savage, 2008). However, findings from these models also suggest relationships that create a sense of belonging are important to cognitive and psychosocial development of college students. Similarly to K-12 attachment literature, relationships with teachers and peers are a predictor of college student development (Astin, 1993). This raises questions about the absence of attachment research within higher education literature, particularly given its generalizability across the developmental lifespan.

Few studies have examined students' attachment to their university. Only one has examined this construct using the University Attachment Scale and their findings revealed statistically lower attachment scores among transfer students (France, Finney & Swerdzewski, 2009). However, these findings were limited to a single sample of traditional 4-year university

students. While traditional students are likely to continue to be a part of the higher education landscape, these institutions are also likely to deal with increasingly transfer and online student populations. Given the nature of the construct, it is reasonable to suspect these types of students may vary in their university attachment.

### **Purpose**

As such, the purpose of this study was to re-examine the factor structure of the University Attachment Scale (UAS) at an institution with a large transfer population and to test the latent means of traditional, transfer and online students for differences in group and member attachment. Identifying these differences, if any, may help to inform higher educational practices, particularly given the relationship of university belonging/attachment to academic self-efficacy, intrinsic motivation, value of academic tasks (Freeman, Anderman, & Jenson, 2007) and alumni giving (Weerts & Ronca, 2009).

### **Literature Review**

Ainsworth (1989) described attachment as a maternal bond, formed at infancy that carries forward throughout our lives and into relationships with others. This construct is relevant to the field of education because those relationships have been shown to be meaningful predictors of school achievement (MacKay et al., 2010) and are associated with increased emotional well-being (Amsden & Greenberg, 1987) and academic success (MacKay et al., 2010; Marcus & Sander-Reio, 2001). For example, positive teacher relationships help to reduce negative behaviors and increase a student's likelihood to persist to graduation (Hallinan, 2008). In contrast, students from single parent households with little parental supervision are less likely to persist (Marcus & Sander-Reio, 2001). Additionally, poor relationships with peers (Mouton, Hawkins, McPherson, & Copley, 1996) or transferring between schools (Rumberger & Larson,

1998) can lead to increased dropout rates, alienation among peers, and a lack of meaningful relationships (Becker & Luthar, 2002).

Attachment behavior is most obvious in early childhood. However, as children move from adolescence into young adulthood, attachment tends to take on the form of autonomy and independence (Wartman & Savage, 2008). Erikson (1968) described autonomy and independence as a primary role of adolescence because a child begins to form a self-definition of their identity and must learn to function independently of their primary caregivers. Although the relationship between the parent and child remain important, so are experiences of independence which lead to successful transition into university life and adulthood.

As a result, higher education literature in this area has historically focused on separation-individuation or the process of defining who you are as an individual with your own perspective, feelings, and ideas (Wartman & Savage, 2008). Separation-individuation was the basis for Chickering's (1969) seminal text *Education and Identity* and has served as a foundation for college student development theory over the past several decades. As a result, the many college student development theories focus on the activities and programs that promote development "toward greater differentiation, integration, and complexity in the ways that individuals think and behave" (Pascarella & Terenzini, 2005, p. 19).

Although college student development research has not historically examined university attachment, findings from research in this area suggest that a sense of belonging or attachment may matter. For example, Pascarella's general model for assessing change suggests "the structural features of an institution are believed to have an indirect rather than a direct influence on student development, with their impact mediated through the institution's environment, the quality of student effort, and students' interactions with peers and faculty members" (Pascarella

& Terenzini, 2005, p. 57). Furthermore, the environmental factors maximizing educational persistence include a peer culture that promotes on-campus student relationships, regular involvement in student activities, and a perception that their university's college to be concerned about them individually (Pascarella & Terenzini).

Attachment theory within higher education and college student development has received some new attention in recent years, particularly as some have begun to argue that theories of separation-individualization are not necessarily in conflict with attachment and can be mutually beneficial (Wartman & Savage, 2008). For example, Josselson (1987) suggested that even though it is necessary for students to become distinct individuals from their parents, maintaining the connection to their parents is an important component of separation-individuation. However, this attachment focus is between parent and student and not necessarily on the role of attachment between the student and institution.

### **University Attachment**

The relationship of belonging or attachment to one's university may also hold value for higher education. Although this literature is limited, classroom belonging at a university has been shown to be "positively related to academic self-efficacy, intrinsic motivation, and value of academic tasks" (France et al., 2009, p. 4). Additionally, emotional attachments have been shown to be important in predicting alumni-giving (Weerts & Ronca, 2009). Unfortunately, few quality measures exist to examine university attachment (Freeman et al. 2007). As such, France et al. (2009) designed an instrument to more specifically measure attachment within the university context. Grounded in the findings of Prentice, Miller, and Lighdale (1994), France et al. (2009) operationalized attachment around affiliation to both the school (or, group) and individuals (or, members) within that school. Findings suggested that transfer students have

lower member attachment scores than traditional students (France et al., 2009). Furthermore, students who were involved in leadership and service scored higher on group attachment than students were not.

Several limitations should be considered in the context of the France et al. (2009) findings. First, the sample used was limited to students at a residential four-year institution with a strong traditional student population when the profile of today's college and university student is considerable different. For example, over fifty percent of students at four-year institutions have been reported as beginning their college or university experience at a different institution (McCormick, Sarraf, BrckaLorenz, & Haywood, 2009). This introduces the possibility that the students in France et al. (2009) may not be representative of populations in the broader higher education landscape.

Additionally, the study by France et al. (2009) did not examine differences in university attachment among online students. Rather, only differences between non-transfer and transfer students were explored. While transfer students may spend less time as a part of the group, online students may spend even less. This may be relevant given that more than 1,600 institutions (i.e., two-year and four-year) report offering a combined total of more than 54,000 online courses (Simonson, Smaldino, Albright, & Zvacek, 2006). Therefore, this group should also be considered in the context of university attachment.

Lastly, these three groups (i.e., traditional, transfer, and online students) may represent theoretically decreasing levels of attachment which may help to inform the construct. Unlike online students, transfer students do attend in-person classes and are more likely to engage with both faculty and peers. This may result in higher levels of university attachment relative to those

who cannot have the same level of engagement as a result of a physical separation from the institution.

Given the limitations in the literature, the University Attachment Scale (UAS) was re-examined among traditional, transfer and online students at a public institution with a large transfer population. We examined (a) the factorial invariance of the scale and (b) whether latent means of university attachment differ between traditional, transfer, and online groups. We hypothesized that transfer students would score lower than traditional students on attachment and that online students would score lower than both traditional and transfer students.

## **Methodology**

### **Procedures**

The University Attachment Scale (UAS) was distributed online during the fall of 2010 via e-mail to a random selection of 10,000 students drawn from the university at large. Participants were asked to voluntarily assist in this study by completing a survey that would be used to explore differences in university attachment between traditional, transfer and online students. The respondents were entered into a drawing for two small gift certificates for their participation. The online survey was made available for a period of 3 weeks.

### **Participants**

Participants in this study were obtained from a large public university in the southwest which enrolls approximately 36,000 undergraduate and graduate students. This institution was selected because it is one of the largest transfer institutions in the country with approximately 3,500 students transferring in each year (Hoover, 2010). Participants were also asked to self-identify as either a traditional, transfer, or online student. Transfer students were defined as students who began their college career at one institution and then transferred to another (Hoyt & Winn, 2004).

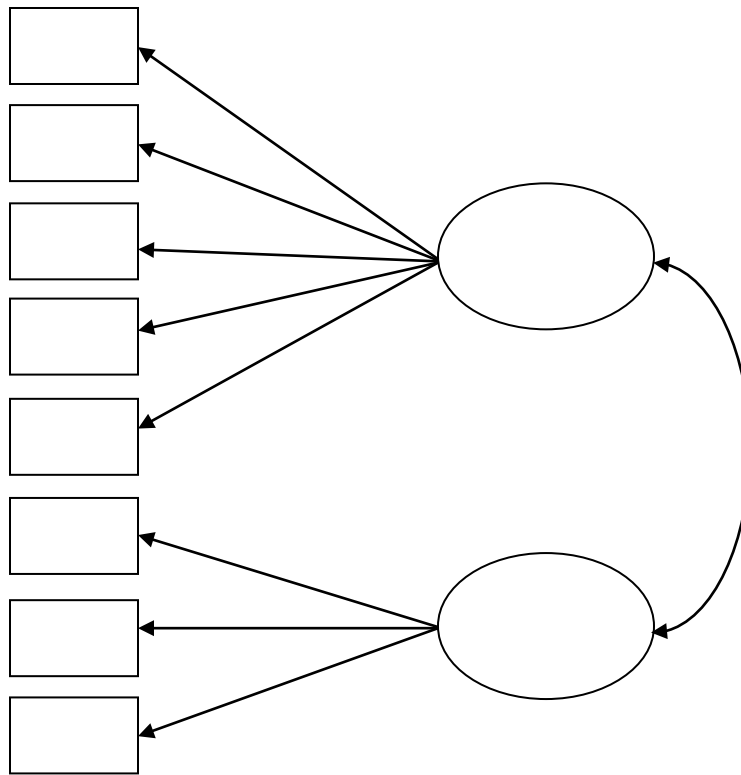


Both the literature and university's office of institutional research were consulted to develop an operational definition of online students, although little consistency was found. Therefore, we decided to consider undergraduate students enrolled in 9 hours or more or graduate students enrolled in 6 hours or more of online courses (i.e., more than 50% of their courses online) as online students.

A total of 1,035 surveys were completed for a response rate of 10.35%. Of those surveys collected, 52 were removed based on substantial missing data. This resulted in 983 usable surveys in the study (online  $n = 50$ , transfer  $n = 372$ , and traditional  $n = 561$ ). Participants were primarily undergraduate students between 18-22 years of age representing all colleges at the university. Approximately 22-28% of participants from the three samples used in the analysis were between the ages of 23 and 30. This was consistent with this university's demographic of transfer and non-traditional students.

### **Instrument**

The University Attachment Scale (UAS) is a nine item instrument and utilizes a 5 point Likert scale in which participants self-report their level of agreement (1 = not at all accurate; 5 = extremely accurate) to statements concerning their attachment to the university. The instrument is purported to measure two dimensions of attachment (see Figure 1): group attachment and member attachment (France et al., 2009). Group attachment refers to the social cohesion of the community which represents the university. Member attachment measures an individual's interactions to other members within that community. The correlation between these two dimensions is reported as  $r = .83$  (France et al., 2009). Both dimensions are positively correlated with morale ( $r = .75$ ) and sense of belonging ( $r = .72$ ).



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*Figure 1.* Structural Model of the University Attachment Scale

### **Model Specification**

A latent means structure analysis was conducted using LISREL 8.8 (Jöreskog & Sörbom, 1996) to test for group differences in the attachment scores of traditional, transfer and online students. Variance/covariance matrices for each of the three samples were developed in PRELIS 2.8 (Jöreskog & Sörbom, 2006). All three groups were specified using the final measurement model suggested by France et al. (2009) as seen in Figure 1.

### **Statistical Analysis**

A structured means analysis was used to test for differences among latent means on attachment between traditional, transfer, and online students. However, latent mean group differences can only be compared if latent variables result from the same factor structure and are

on the same scale (Hong, Malik, & Lee, 2003). Therefore, a series of increasingly restrictive factor structure invariance tests were also conducted prior to the analysis using guidance from the literature (Bowden, Gregg, Bandalos, Davis, Coleman, Holdnack, & Weiss, 2008; Hong et al., 2003; Milfont & Fischer, 2010; Vandenberg & Lance, 2000). This included hierarchical tests of configural, metric, and scalar invariance. For both the traditional and transfer student samples, the subject to item ratio was above the 10:1 ratio recommended in the literature (Osborne & Costello, 2004; Tabachnick & Fidell, 2007). The online student sample was notably smaller but still above a 5:1 ratio some have considered acceptable (Gorusch, 1983).

### **Model Evaluation**

The adequacy of each invariance model was tested first using  $\chi^2$  which “assesses the magnitude of discrepancy between the sample and fitted covariances matrices” (Hu & Bentler, 1999, p. 2). Although this is the most common method for evaluating differences between models (i.e., configural, metric, etc), it is sensitive to sample size and should not be used as a sole criterion. We also examined change in CFI, with changes of less than .01 indicating the invariance hypotheses should not be rejected (Vandenberg & Lance, 2000). Overall, the following practical fit indices were used in the evaluation of model invariance: Non-normed fit index (NNFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Values of .95 or above for the CFA and NNFI and values of RMSEA of .06 or smaller generally indicate good fit (Hu & Bentler, 1999). In addition to fit indices, standardized factor pattern coefficients, standardized residuals and modification indices were also considered in model evaluation.

## Results

### Descriptive Statistics

Means, standard deviations, and correlations between factors are reported in Table 1. These statistics were computed from factor scores estimated using standardized item weights and scores as discussed in Grice (2001). Results suggested group attachment scores were generally between .78 to .98 units higher than member attachment scores. This pattern was consistent with previous research, although these differences were generally larger in the present sample relative to those examined in France et al. (2009). Additionally, traditional students reported higher group and member attachment relative to transfer and online students. Transfer students scored approximately .35 units higher on both dimensions of the UAS relative online students.

Table 1

*Correlations, Descriptive Statistics, and Alpha Reliability Estimates for Latent Factors of the University Attachment Scale*

	Traditional		Transfer		Online	
	Group	Member	Group	Member	Group	Member
Group	--		--		--	
Member	0.68	--	0.66	--	.77	--
<i>M</i>	3.97	3.18	3.49	2.51	3.14	2.16
<i>SD</i>	.46	.50	.78	.85	.81	.73
Skewness	-.404	-.176	-.468	.191	-.161	.461
Kurtosis	-.176	-.456	-.162	-.464	-.060	-.478
$\alpha$	.842	.729	.809	.727	.843	.684

Internal consistency for the scores was generally at or above recommended values for general research (Henson, 2001) on the group attachment factor ( $\alpha \geq .81$ ). These estimates were somewhat lower for member attachment ( $\alpha \geq .68$ ) but still reasonably close to internal consistency estimates reported by France et al. (2009) for this factor ( $\alpha = .74, .71$ ). The deletion of item 9 could have improved internal consistency for member attachment to  $\alpha = .70$

among online students and  $\alpha = .74$  among transfer students. However, this improvement was considered marginal and therefore no modifications were made.

The two factors were also found to be moderately and positively correlated with one another (Table 1) which was consistent with findings from France et al. (2009). Pearson  $r$  correlation coefficients ranged between  $r = .66$  and  $.77$  for all three groups. In addition, normality was examined given the potential for issues associated with non-normality when maximum likelihood (ML) estimation is used in the analysis (Curran, West, & Finch, 1996). Univariate normality for the scale is reported in Table 1. Skewness and kurtosis values were below recommended guidelines in the literature (Curran et al., 1996), suggesting the distribution of item scores were univariate normal. However, multivariate normality was also considered given the use of structural equation modeling in this study (Hong et. al., 2003). Specifically, graphical methods described in Henson (1999) were employed. No outliers were identified based on plots of chi square and Mahalanobis distance values. Therefore, the data were assumed to be both univariate and multivariate normal.

### **Tests of Invariance**

*Configural invariance.* Three models explored in France et al. (2009) were replicated first in this study to establish one common model fit the data. These models included a (a) nine-item two-factor model with no modifications, (b) a nine-item two-factor model with correlated errors between items 2 and 4, and (c) an eight item two-factor model without item 4. Within each model, configural invariance was tested by constraining the factor structures to be the same across groups. It was hypothesized that the eight item two-factor model would best fit the data. Results indicated the data and the model-implied covariance matrices were statistically significantly different. Model  $\chi^2$  was highest within the nine-item model with no modifications

to the scale. However, this value decreased as a result of correlating error terms between items 2 and 4 and was further reduced after removing item 4. Both NNFI and CFI values remained relative stable across all models. However, RMSEA values showed modest improvement within the eight item model. Collectively, this seemed to support the eight item two-factor model was a better statistical fit relative to the other two models (Table 2) and was used in subsequent invariance tests.

Table 2

*Goodness-of-Fit Statistics for Baseline Model Estimation of University Attachment Scale*

	$\chi^2$	<i>df</i>	NNFI	CFI	RMSEA	90% CI
<i>Nine Item Two-Factor Model</i>						
Traditional	120.06*	26	.97	.98	.079	.065; .094
Transfer	85.79*	26	.96	.97	.079	.061; .098
Online	32.89	26	.97	.98	.056	.000; .130
<i>Nine-Item Two-Factor Model with Correlated Errors between Items 2 &amp; 4</i>						
Traditional	71.35*	25	.98	.99	.056	.040; .072
Transfer	73.42*	25	.97	.98	.071	.053; .091
Online	32.79	25	.97	.98	.065	.000; .140
<i>Eight Item Two-Factor Model without Item 4</i>						
Traditional	56.57*	19	.98	.99	.056	.028; .100
Transfer	61.06	19	.96	.97	.076	.054; .098
Online	21.87	19	.98	.99	.035	.000; .130

Table 3

*Tests of Invariance\* for the 8 Item Two Factor Model of the University Attachment Scale (UAS).*

Model	$\chi^2$	<i>df</i>	$\Delta \chi^2$	$\Delta df$	<i>p</i>	NNFI	CFI	RMSEA
1. Configural Invariance	191.89*	73	--		--	.97	.98	.068 .055; .08
2. Metric Invariance	214.38*	85	22.49	12	.001	.97	.97	.068 .056; .079
3. Scalar Invariance	260.74*	97	46.36	12	<.001	.97	.97	.071 .061; .082
4. Latent Mean Invariance	302.91*	107	45.82	4	<.001	.97	.96	.073 .063; .083

\*  $\chi^2$  values reflected in this table represent global fit indices.

*Metric invariance.* Having established the eight item two factor model as the baseline model in this study, the groups were then tested to determine if participants responded to items and their respective underlying constructs in a similar fashion. This was accomplished by constraining the factor pattern coefficients to be equal across groups. As a result,  $\chi^2$  increased from 191.89 to 214.38 and gained 12 degrees of freedom (Table 3). The  $\chi^2$  difference test was statistically significant ( $\chi^2 [12, n = 983] = 22.49, p < .001$ ). However, the minimal change to additional fit indices suggested the invariance hypotheses should not be rejected (RMSEA = .068 [90CI: .072-.083]; CFI = .97; NNFI = .97). This was further confirmed by examining factor pattern and structure coefficients (Table 4). Factor pattern coefficients for items on identified factors were all above .30 and item structure coefficients for unidentified factors were not greater than identified factors. This further confirmed the statistical equivalence of the eight item two factor model in this study.

Table 4

*Factor Pattern & Structure Coefficients for 8 Item 2 Factor Model*

	Traditional				Transfer				Online			
	Group		Member		Group		Member		Group		Member	
	<i>P</i>	<i>r<sub>s</sub></i>	<i>P</i>	<i>r<sub>s</sub></i>	<i>P</i>	<i>r<sub>s</sub></i>	<i>P</i>	<i>r<sub>s</sub></i>	<i>P</i>	<i>r<sub>s</sub></i>	<i>P</i>	<i>r<sub>s</sub></i>
UAS <sub>1</sub>	0.65	0.65	--	0.38	0.65	0.65	--	0.55	0.65	0.65	--	0.55
UAS <sub>2</sub>	0.59	0.59	--	0.34	0.59	0.59	--	0.50	0.57	0.57	--	0.48
UAS <sub>3</sub>	0.81	0.81	--	0.47	0.84	0.84	--	0.71	0.76	0.76	--	0.64
UAS <sub>5</sub>	0.71	0.71	--	0.41	0.71	0.71	--	0.60	0.77	0.77	--	0.65
UAS <sub>6</sub>	0.84	0.84	--	0.49	0.86	0.86	--	0.72	0.85	0.85	--	0.71
UAS <sub>7</sub>	--	0.39	0.67	0.67	--	0.66	0.79	0.79	--	0.66	0.79	0.79
UAS <sub>8</sub>	--	0.40	0.69	0.69	--	0.65	0.77	0.77	--	0.61	0.73	0.73
UAS <sub>9</sub>	--	0.32	0.56	0.56	--	0.42	0.50	0.50	--	0.29	0.35	0.35

*Scalar invariance.* Scalar invariance was then tested by constraining the intercepts of items to be the same across groups. Again, the adequacy of this model was examined by

comparing differences in  $\chi^2$  values which increased from 214.38 to 260.74 and gained 12 degrees of freedom (Table 4). Although the  $\chi^2$  difference test was statistically significant ( $\chi^2$  [12, n = 983] = 46.36,  $p < .001$ ), there was little or no change to the additional fit indices suggesting the invariance hypotheses should not be rejected (RMSEA = .071 [90CI: .061-.082]; CFI = .97; NNFI = .97). Therefore, it was assumed the UAS was scalar invariant across traditional, transfer, and online students.

*Latent mean invariance.* Having established a configural, metric and scalar invariance, the latent means of traditional, transfer and online students were then tested in the analysis. However, latent variable means cannot be directly estimated (Hancock, 1997). Rather, this difference should be estimated by fixing one of the construct means to zero. As such, traditional student attachment means were fixed to zero and served as the basis for comparison in this study. Initial results indicated the data and the model-implied covariance matrices were statistically significantly different  $\chi^2$ , (107,  $N = 983$ ) = 302.91,  $p < .001$  (Table 4). However, examination of additional fit indices suggested acceptable global model fit across all three groups and little change in those fit indices relative to test of configural, metric, and scalar invariance (RMSEA = .073 [90CI: .063-.083], CFI = .96, and NFI = .97). Therefore, the latent means across all three groups were assumed to be equal.

Because statistical significance testing is impacted by sample size and does not necessarily inform anything directly about the magnitude of latent mean differences, the magnitude of these latent mean differences was also examined using completely a standardized metric, which can be interpreted as Cohen's  $d$  (Bowden, Gregg, Bandalos, Davis, Coleman, Hodnack, & Weiss, 2008). Results suggested group attachment scores were relatively stable across groups (i.e., less than approximate Cohen's  $d$  values of -.10). However, online students



did score moderately lower than traditional (-.61) and transfer students (-.34) on member attachment (Table 5). Although there are few opportunities in which to compare these group differences across studies, these differences were considered notable given they were in the hypothesized direction for both transfer and online students.

Table 5.

*Latent Mean Differences for Model 4*

Means of latent variables (Covariance matrix metric)		
	Group	Member
Traditional	0	0
Transfer	-.02	-.31
Online	-.21	-.71
Means of latent variables (Completely standardized metric)		
	Group	Member
Traditional	0	0
Transfer	-.01	-.27
Online	-.10	-.61

## Discussion

The purpose of this study was to test the factorial invariance of the UAS and latent mean difference between traditional, transfer and online students on group and member university attachment. Results of this study suggest that the UAS appears to demonstrate factorial stability across traditional, transfer and online students and may suggest the UAS as a suitable instrument to measure university attachment across these institutional types.

That being said, structure coefficients ( $r_{\zeta}$ ) for online student member attachment suggest item 9 may not adequately define this latent factor. Item 9 asked students how many of their close friends came from the university. Unlike traditional and transfer students, online students can access university resources and classes from presumably anywhere. Therefore, online students may not respond to this specific item similarly to traditional or transfer students. This

may have contributed to differences in these factor pattern coefficients between groups. That being said, both factor pattern and structure coefficients were above minimum values for identified factors in this model (Online students:  $r_s = .35$ ; Traditional students:  $r_s = .56$ ; Transfer students  $r_s = .50$ ). Therefore, the differences between these coefficients may not warrant concern.

Findings from this study also indicate the latent means of university attachment among these three groups were different. Specifically, online students scored .61 standardized units less on university attachment than traditional students and .34 units less than transfer students. This may raise concerns among administrator regarding the impacts of these demographics given the changing higher education landscape. It has been suggested that transfer students may experience feelings of anonymity, and a decreased sense of community or isolation as a result of the differences between colleges and universities (Laanan, 2001). Even among an institution with a large transfer student population, results from this study seem to support those conclusions. As such, transfer and online student programs may need to consider the impact of these differences on college student outcomes such as academic performance and persistence.

Finally, online programs and services have become “an ubiquitous feature of most universities” (Smith & Mitry, 2008, p. 147). This is a concern given that students who take a majority of their classes online score lower on group attachment. That being said, there are many ways in which online students could be operationalized. For example, online students were defined in this study as those enrolled in 9 hours of more or graduate student enrolled in 6 hours or more of online courses (i.e., more than 50% of their courses online). It could argued that this group should consist of only students who are fully online (i.e., no face to face courses). However, this operationalization of online student may only widen the gap in university

attachment scores between these groups. As such, this issue should be explored further at other institutions, including for-profit colleges and universities.

School attachment has received considerable attention in K-12 literature but relatively unexplored at the post-secondary level. The university attachment scale (UAS) is a relatively new instrument and may provide an opportunity to bridge this gap in the literature, particularly given its theoretical connection to other constructs in the literature. This study examined university attachment at an institution with a large transfer student population among traditional, transfer and online students and found no meaningful differences in factor structure, and only one moderate difference between latent variable means. As such, university attachment may be a relatively stable construct among these groups.

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