





# Studying the effects of sense of belonging to virtual communities in psychological well-being and adjustment to academic setting

## *Estudio de los efectos del sentido de pertenencia a comunidades virtuales en el bienestar psicológico y el ajuste al contexto académico*

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### ABSTRACT

The literature has shown a direct relationship between the psychological sense of belonging with psychological well-being and academic involvement in physical communities. However, new technologies have favored the formation of communities in

cyberspace, with scarce research at the university level addressing their impact. For this reason, an *ex post facto* study has been designed with the aim of knowing the relationship between the psychological sense of belonging to virtual communities with psychological well-being, with academic involvement, academic satisfaction, and the perception of justice of the academic outcomes. In addition, the possible influence of the gender factor was considered. 1,035 undergraduate students from Spanish universities responded to the Scale of Psychological Sense of Community in Virtual Groups (SCGV), to the Scale of Psychological Well-being (EBP) and to an *ad hoc* instrument designed to measure academic involvement, academic satisfaction and perception of justice of the academic outcomes. The results revealed that the successful virtual sense of belonging is related to greater subjective, economic and academic well-being, while increasing academic participation, academic satisfaction and the perception of justice of the academic outcomes. Moreover, the influence of the gender factor was also found, as it revealed greater academic well-being in women and differences in academic participation between men and women. The implications of the results are discussed in terms of the benefits for the students of integration and participation in virtual academic communities for the well-being, academic involvement, academic satisfaction and perception of justice of the academic outcomes.

**Key words:** academic involvement, academic satisfaction, perception of justice, academic outcomes

## ABSTRACT

La literatura ha puesto de manifiesto una relación directa del sentido psicológico de pertenencia con el bienestar psicológico y la participación académica en comunidades físicas. Sin embargo, las nuevas tecnologías han favorecido la formación de comunidades en el ciberespacio, siendo muy escasa la investigación en el ámbito universitario que aborde su impacto. Por ello, se ha diseñado un estudio *ex post facto* con el objetivo de conocer la relación entre el sentido psicológico de pertenencia a comunidades virtuales con el bienestar psicológico y con la participación y satisfacción del alumnado, así como con la percepción de justicia con los resultados obtenidos. Además, se contempló la posible influencia del factor género. 1,035 estudiantes de grado de universidades españolas respondieron a la Escala de Sentido Psicológico de Comunidad en Grupos Virtuales (SCGV), a la Escala de Bienestar Psicológico (EBP) y a un instrumento *ad hoc* diseñado para medir la participación, la satisfacción y la percepción de justicia. Los resultados revelaron que el sentido de pertenencia virtual exitoso se relaciona con un mayor bienestar subjetivo, económico y académico, y con un incremento en la participación académica, la satisfacción con la titulación y la percepción de justicia en los resultados obtenidos. Además, también se constató la influencia del factor género al revelarse un mayor bienestar académico en las mujeres y diferencias en la participación académica entre hombres y mujeres. Se discuten las implicaciones de los resultados obtenidos en términos de los beneficios para el alumnado de la participación e integración en comunidades virtuales académicas en el

bienestar personal, de la participación y satisfacción académicas y la percepción de justicia en los resultados académicos obtenidos.

**Keywords:** participación académica, satisfacción académica, percepción de justicia, resultados académicos

## INTRODUCTION

The sense of belonging refers, by one side, to a social dimension, belonging, i.e., to the belief to be part of or connected to a particular location or group of individuals (Freeman et al., 2007), and, by other, to a psychological dimension i.e., “the cognitive evaluation of his or her role in relation to the group results in an affective response” (Hurtado & Carter, 1997, p. 328). It is one of the components of the sense of community that has received greater attention in the academic field in different educational stages (Sanmarco et al., 2020) and that alludes to “students’ sense of being accepted, valued, included, and encouraged by others (teacher and peers) in the academic classroom setting and of feeling oneself to be an important part of the life and activity of the class” (Goodenow, 1993, p. 25), and the quality of relationships with others on campus (Lewis et al., 2021). The literature has shown that a sense of belonging among university students increases academic motivation and enjoyment of studies, improves student performance and reduces the likelihood of students dropping out of the education system (Pedler et al., 2022). Particularly in higher education, the relationship of the sense of belonging with students’ academic success has been established, as well as with increased motivation and well-being (Goodenow, 1993; Pedler et al., 2022). Furthermore, the desire to belong can lead students to become involved, and a greater participation can increase belonging (Knekta et al., 2020). On the other hand, it played an important role in the social integration of students in risk of exclusion (Lewis et al., 2021). Literature stressed that the sense of belonging could favor the psychological adjustment of students to stressors or adverse situations. In this sense, it has been found that frustrated belongingness and perceived burden contributed to increased interpersonal shame, which influenced students’ future depression (Carrera & Wei, 2017). In fact, frustrated belonging may even be related to suicidal ideation in students (Chu et al., 2017).

Traditionally, in the educational context, the sense of belonging has been studied in the classroom as a physical community. However, the rise of the new technologies has led to the development of virtual communities for academic use, which are generated in cyberspace (Méndez & Galvanovskis, 2011). A virtual community is a social aggregation in cyberspace in which personal relationships are formed and in which the sense of virtual community rises (Luo et al., 2017). Virtual communities

also appropriate social processes that are exclusive to physical or traditional communities (Blanchard & Markus, 2004), giving input to feelings of attachment to the group and of belonging. Research has indicated that *using technology* can contribute to increasing participation and involvement in courses, as well as the university community at large (Bond et al., 2020). Currently, it is considered crucial that research addresses the sense of belonging, but the literature on the sense of belonging in virtual communities in the academic context is still scarce.

Literature has found an unequal participation and involvement of female and male students in academic setting. Thus, female students exhibit a lower sense of belonging in STEM (Science, Technology, Engineering and Mathematics) carriers (Rainey et al., 2018). Meanwhile males participate more in academic activities (e.g. post-discussion prompted and voluntary interactions) (Aguillon et al., 2020). Nonetheless, a meta-analytic review with school-aged children and adolescents revealed that children and adolescent females reported a higher sense of belonging than males (Allen et al., 2018). Having in mind the state of the literature, an *ex post facto* field study was designed with the aim of knowing the relationship between the psychological sense of belonging to virtual communities with psychological well-being, with academic involvement, academic satisfaction, and the perception of justice of the academic outcomes. Additionally, and based on the unequal participation and involvement of female and male students in academic setting (moderator), gender was incorporated to the study design as a factor.

## METHOD

### Participants

A total of 1035 students from the Spanish public university system with ages between 18 and 55 years ( $M = 21.57$ ,  $SEM = 0.103$ ) participated in the study. Of these, 812 (78.5%) belonged to the female sex and their ages ranged between 18 and 55 years ( $M = 21.52$ ,  $SEM = 0.117$ ), and 223 (21.5%) to the male with ages that varied between 18 and 40 years ( $M = 21.76$ ,  $SEM = 0.221$ ). The students belonged to the University of Santiago de Compostela (25.0%), the Autonomous University of Madrid (22.0%), the University of Zaragoza (19.0%), the University of Vigo (18.0%) and the University of the Balearic Islands (16.0%). Regarding the academic year, 67% were in the third year, 12.9% in the fourth, 10% in the second, 9.8% in the first, 0.3% in the fifth and 0.1% in the sixth year. The five of them being represented as large areas of knowledge: Social and Legal Sciences (25%), Health Sciences (23%), Arts and Humanities (20%), Engineering and Architecture (17%) and Sciences (15%).

## Design and procedure

An “ex post facto” study was carried out in order to analyze the relationship between the psychological sense of belonging to the community in virtual groups with psychological well-being, and with academic involvement, academic satisfaction with the degree and the perception of justice of the academic outcomes. For this, the participants were classified, with the norms of the Sense of Belonging in Virtual Groups Scale (Novo et al., 2016) into three groups: failed sense of belonging, normal sense of belonging and successful sense of belonging. Next, the three groups were contrasted in the study variables (well-being, involvement, academic satisfaction and perception of justice of the academic outcomes), considering the gender of the participants in the analyses.

The sample was selected by means of accidental sampling. In this sense, the researchers invited university students to participate in a study on the sense of belonging to groups and well-being. In order to participate in the study, they were required to be users of virtual communities in the academic field. The aims and the procedure of the research were explained in detail to the interested students. It was also emphasized that participation would be voluntary, that it would not entail any academic or economic benefit, and that they could stop the completion of the questionnaires at any time if they considered appropriate. The confidentiality and anonymity of the information collected was also guaranteed and that it would be treated solely and exclusively for research purposes. Participants gave their informed consent, and the data were processed and stored in adherence with the Spanish Data Protection Law (Ley Orgánica 3/2018, de 5 de diciembre, de Protección de Datos Personales y Garantía de los Derechos Digitales).

## Measurement instruments

For the evaluation of sense of belonging, the Community Sense Scale in Virtual Groups (SCGV; Novo et al., 2016) was applied. This scale consisted of three dimensions that measure influence, sense of belonging and needs satisfaction, from which we took the evaluation of the sense of belonging ( $\alpha = .80$  in the current study) composed of 5 items that subjects responded on a 5-point Likert scale from *strongly disagree* (1) to *strongly agree* (5). This variable was categorized in three levels: failed, normal and successful sense of belonging. For this classification we took the norms of the scale stating that a score  $\leq 9.80$  ( $Z \leq -1.28$ ) classifies the sense of belonging as failed; scores within the range  $9.80 < \text{score} < 21.72$  (normal interval:  $M \pm 1.28$ ) classifies the subjects as normal or standard group in sense of belonging; and a score  $\geq 21.72$  ( $Z \leq 1.28$ ), classifies the subjects as successful in sense of belonging.

As for the assessment of psychological well-being, the Psychological Well-being Scale (EPB; Sánchez-Cánovas, 2013) was used. It consisted of 65 items with a Likert-type response format, also with five points from *never* (1) to *always* (5) divided into 4 subscales: subjective psychological well-being, material well-being, work well-being, and well-being with couple relationships. In the present study, the subjective psychological well-being, material well-being, work well-being subscales were employed.

As for the measurement of the academic involvement an ad hoc instrument was created assessing all the dimensions related to participation (Groccia, 2018): participation in class, consultation of doubts, attention to tutorials, attendance to class, completion of work, attention given in class and attitude towards classes. Participants answered on a 5-point Likert scale ranging from *never* (1) to *always* (5). This measure was internally consistent,  $\alpha = .702$ , with all items contributing to the measure (item-test correlations  $> .30$ ).

Finally, academic satisfaction and perception of justice of the academic outcomes were evaluated, each one of them, through a single item: "I am satisfied with the chosen degree" and "The evaluations I receive are usually fair", respectively. Both items, as for academic involvement, were answered on a 5-point Likert-type response scale from *never* (1) to *always* (5).

## Data analysis

A multivariate analysis of variance (MANOVA) using a full factorial model in order to study the effects of gender (woman vs. man) and sense of belonging (failed, normal and successful) on well-being ( $\eta^2 = .472$ ;  $r_s > .335$ ) was applied. Analysis of variance is a robust test to variance heterogeneity when groups are of equal or approximately equal sizes (large/small  $< 1.5$ ). In our case, this assumption was not fulfilled in three comparisons ( $678/83 = 8.2$ ,  $678/113 = 6.0$  y  $680/194 = 3.5$ ). Although many researchers were not considering it relevant, the lack of homogeneity of variance can cause important deviations in the significance of the results (Stevens, 1986). In the multivariate  $F$ , the Pillai-Bartlett trace ( $V$ ) is robust to the heterogeneity of variance (Olson, 1976). Thus, Pillai-Bartlett trace was taken in this study as multivariate  $F$ . But in the univariate tests, if the variability is greater in the small group, the  $F$  is liberal, and vice versa. Hence, the theoretical  $F$  value (Box's conservative test,  $33.841/2.996$ ) was contrasted with the empirical value in order to validate the correct acceptance or rejection of the null hypothesis so that, if the theoretical  $F$  is lower than the empirical, the alternative hypothesis is accepted, and vice versa (Mayorga et al., 2020). With this method, it was found that the empirical  $F$ s gave the same results of acceptance or rejection of the null hypothesis as the theoretical  $F$ s. Post hoc comparisons were executed with the Howell and Dunnett

C test, designed for comparisons of large groups ( $n > 30$ ) with heterogeneous variances, and with Bonferroni correction ( $\alpha/m$ ) for multiple comparisons with equal variances. The effect size was calculated in  $\eta^2_p$  for multivariate and multiple comparisons, interpreting it in terms of the explained variance, and in  $d$  with the formula of Hedges when  $N1 \neq N2$  and with Glass ( $SD$  of the normal group) when the assumption of homogeneity of variances was violated, correcting the bias in the effect size –Hedges’s correction–, and interpreting the magnitude of the effect of  $d$  in terms of the increase (+) or decrease (-) in the measurement variable (Fandiño et al., 2021; Gancedo et al., 2021). The comparison of means is of great scientific interest and for the generation of knowledge, but for a good understanding of the results it is necessary to complete it with the study of errors; that is, of the probability of cases contrary to the model, for which the Probability of an Inferiority Score was calculated (PIS; Gallego et al., 2019; Redondo et al., 2019) which is an estimation of the probability of individuals in the group with a score in the measurement variable under (or over, depending of the researcher interest) the mean of the contrast group (that is, contrary to the prediction of the statistical model).

The association between variables was analyzed with chi-square test, estimating the effect size with Cramer’s  $V$  ( $df > 1$ ).

## RESULTS

### Analysis of the relationship between the sense of belonging and well-being

The results did not show an association,  $\chi^2(2, N = 1003) = 3.41, ns$ , Cramer’s  $V = .058$ , between subjects’ gender and the sense of belonging, that is, men and women are equally distributed in the categories of the sense of belonging (failed, normalized, successful).

The results of a MANOVA 2 (gender: women vs. men) X 3 (sense of belonging: failed, normalized, successful) showed a significant multivariate effect for the gender factor,  $F(3, 886) = 9.18, p < .001, 1-\beta = .999$ , explaining 3.1% of the variance,  $\eta^2_p = .031$ , and for the sense of belonging factor,  $F(6, 1734) = 6.12, p < .001, 1-\beta = .997$ , which accounts for 2.1% of the variance,  $\eta^2_p = .021$ , but not so for the interaction,  $F(6, 1734) = 0.66, ns, 1-\beta = .267$ . Univariate effects (see Table 1) revealed that women report significantly higher academic well-being than men, with the increase in academic well-being at 13.8% ( $r = .138$ ), while the probability that women obtain a score lower than the mean of the group of men (error) is 38.9% (PIS = .389).

**Table 1***Univariate Effects on Well-being for the Gender Factor. Between-subjects Effects*

Variable	<i>F</i>	<i>p</i>	<i>d</i>	1- $\beta$	$M_w$	$M_m$
Subjective	3.57	.059	-0.01	.471	92.48	95.53
Economic	0.12	.727	-0.02	.064	31.67	31.89
Academic	12.82	.000	0.28	.947	36.71	34.44

Note.  $df(1, 868)$ ;  $M_w$  = mean of the group of women;  $M_m$  = mean of the group of men.

The univariate effects (see Table 2) warned of a significant effect of the relevance felt factor on subjective, economic and academic well-being. Regarding subjective well-being, post hoc contrasts specified that individuals with a failed sense of belonging reported lower subjective well-being than those of the normalized and successful group, estimating the decrease in subjective well-being at 11.9% ( $r = .119$ ) y 25.2% ( $r = -.252$ ), respectively; being the probability of model error of 40.5% (PIS = .405) and 30.1% (PIS = .301), that is, that in the group of failed sense of belonging there are subjects with scores higher than the mean of the normalized and successful groups. In the same line, those in the normalized sense of belonging group showed a lower subjective well-being than those in the successful group, quantified at -13.9% ( $r = -.139$ ) and the probability of error (i.e., obtaining a score higher than the mean of the group of successful sense of belonging in the normalized group) in 39.0% (PIS = .390). In relation to economic well-being, the subjects of the groups with a failed and normalized sense of belonging expressed a lower economic well-being than those of the successful group, rated at -17.2% ( $r = -.172$ ) and -20.6% ( $r = .206$ ), and with a probability of error of the model of 36.3% (PIS = .363) and 33.7% (PIS = .337), that is, that in the groups of normalized and failed sense of belonging there are subjects with scores greater than the mean of the successful group, respectively. Finally, and for academic well-being, the people in the group with a failed sense of belonging revealed lower academic well-being than those in the normalized and successful group, a decrease quantified in 20.6% ( $r = -.206$ ) and 36.3% ( $r = -.363$ ), and with a model error probability of 33.7% (PIS = .337) and 21.7% (PIS = .217), that is, that in the failed sense of belonging group there are subjects with higher scores to the mean of the normalized and successful groups, respectively. In the same way, the subjects of the normalized membership group were attributed lower academic well-being than those of the successful group, a decrease estimated at 17.7% ( $r = -.177$ ); and with a model error probability of 35.9% (PIS = .359), that is, that in the normalized belonging group there are subjects with scores higher than the mean of the successful group.



**Table 2**

*Univariate Effects on Wellbeing for the Sense of Belonging Factor. Between-subjects Effects*

Variable	<i>F</i>	<i>p</i>	$\eta^2_p$	$1-\beta$	$M_{pf}$	$M_{pn}$	$M_{pe}$	$d_1$	$d_2$	$d_3$
Subjective	7.08	.001	.016	.930	89.77	93.71	98.36	-0.24	-0.28	-0.52
Economic	5.93	.003	.013	.878	30.66	31.17	33.51	-0.07	-0.35	-0.42
Academic	15.23	.000	.034	.999	32.98	35.70	38.03	-0.42	-0.36	-0.78

*Note.*  $df(2, 868)$ ;  $M_{pf}$  = mean of the group of failed sense of belonging;  $M_{pn}$  = mean of the normalized sense of belonging group;  $M_{pe}$  = mean of the group of successful sense of belonging;  $d_1$  = effect size for the comparison of failed group vs. normalized;  $d_2$  effect size for the comparison normalized group vs. successful g;  $d_3$  = effect size for the failed group vs. successful.

### **Analysis of the relationship between the sense of belonging with academic involvement and academic satisfaction with the degree and the perception of justice of the academic outcomes**

In relation to academic involvement, the results of a MANOVA 2 (gender: male vs. female) X 3 (sense of belonging: failed, normalized, successful) showed a significant effect for the gender factor,  $F(7, 977) = 5.96$   $p < .001$ ,  $1-\beta = 1$ , explaining 4.1% of the variance,  $\eta^2_p = .041$ , and for the sense of belonging factor,  $F(14, 1956) = 2.91$ ,  $p < .001$ ,  $1-\beta = .996$ , which accounts for 2.0% of the variance,  $\eta^2_p = .020$ , but not for the interaction,  $F(14, 1956) = 0.76$ ,  $ns$ ,  $1-\beta = .503$ .

Thus, the results of the univariate effects on academic involvement for the gender factor (see Table 3) revealed that women did more jobs, quantified by 10.9% more ( $r = .109$ ) and a probability of error (women who do less work than the average of men) of 41.3% (PIS = .413), have a more positive attitude towards classes, estimated at 8% ( $r = .080$ )% more and a margin of error of 43.6% (PIS = .436), and they attend more classes than men, appreciated by 13.9% more ( $r = .139$ ) and with a probability of prediction error of 39.0% (PIS = .390), while they participate less in class, 11.9% less ( $r = -.119$ ), with the estimated error (percentage of women who participate more in class than men) at 40.5% (PIS = .405).

The results of the univariate effects on academic involvement (see Table 4) showed differences between the groups of failed, normalized and successful sense of belonging in class participation, attending tutorials, attitude in class and class attendance. In this regard, post hoc comparisons revealed that the individuals of the group with a normalized sense of belonging expressed more positive attitude towards the classes, 11.4% more ( $r = .114$ ) and a margin of error of 40.9% (PIS = .409), than those of the failed group; that those of the normalized group participated less in class, 14.8% less ( $r = -.148$ ) and an error (probability that the normalized group registers a participation higher than half of the successful group) of 38.2% (PIS = .382), less

attended tutorials, 11.9% less ( $r = -.119$ ) and an error rate of 40.5% (PIS = .405), and they have a less positive attitude, 18.8% less ( $r = -.188$ ) and a margin of error of 35.2% (PIS = .352), than those of the successful group; and that those of the failed group assume a less positive attitude in class, 29.6% less ( $r = -.296$ ) and an error encrypted in 26.8% (PIS = .268), they attend class less, 16.8% less ( $r = -.168$ ) and a margin of error of 36.7% (PIS = .367), and they attended fewer tutorials, 16.8% less ( $r = -.168$ ) and an error rate of 36.7% (PIS = .367), than those of the successful group.

**Table 3**

*Univariate Effects on Academic Involvement for the Gender Factor. Between-subjects Effects*

Variable	<i>F</i>	<i>p</i>	<i>d</i>	$1-\beta$	$M_w$	$M_m$
Class participation	11.13	.001	-0.24	.915	3.03	3.39
Performing works	8.61	.003	0.22	.835	3.59	3.24
Attend tutorials	0.00	.986	0.00	.050	2.47	2.47
Consult doubts	0.01	.969	0.01	.050	3.28	3.27
Pay attention	0.24	.624	0.04	.078	3.20	3.15
Attitude in class	4.59	.032	0.16	.571	4.00	3.82
Class attendance	14.41	.000	0.28	.967	4.52	4.25

Note.  $df(1, 983)$ ;  $M_w$  = mean of the group of women;  $M_m$  = mean of the group of men.

**Table 4**

*Univariate Effects on Academic Involvement for the Sense of Belonging Factor. Between-subjects Effects*

Variable	<i>F</i>	<i>p</i>	$\eta^2_p$	$1-\beta$	$M_f$	$M_n$	$M_s$	$d_1$	$d_2$	$d_3$
Class participation	4.71	.009	.009	.789	3.16	3.04	3.42	-0.09	-0.30	-0.21
Performing works	2.09	.124	.004	.431	3.34	3.31	3.59	0.03	-0.21	-0.19
Attend tutorials	4.01	.018	.008	.717	2.26	2.40	2.76	0.09	-0.24	-0.34
Consult doubts	2.65	.071	.005	.527	3.10	3.26	3.47	0.14	-0.16	-0.29
Pay attention	1.88	.154	.004	.392	3.06	3.13	3.33	0.05	-0.17	-0.22
Attitude in class	12.29	.000	.024	.996	3.63	3.86	4.24	0.23	-0.38	-0.62
Class attendance	4.10	.017	.008	.727	4.24	4.39	4.52	0.18	-0.16	-0.34

Note.  $df(2, 983)$ ;  $M_f$  = mean of the failed sense of belonging group;  $M_n$  = mean of the normalized sense of belonging group;  $M_s$  = mean of the successful sense of belonging group;  $d_1$  = effect size for the comparison normalized group vs. failed;  $d_2$  effect size for the comparison normalized group vs. successful;  $d_3$  = effect size for the failed group vs. successful.

Regarding academic satisfaction, an ANOVA 2 (gender: male vs. female) X 3 (sense of belonging: failed, normalized, successful) was executed with a full factorial design, the results showed that women are satisfied with the degree by an equal,  $F(1, 955) = 0.54$ , *ns*, than men; while the sense of belonging means differences in the evaluation of the academic satisfaction,  $F(1, 955) = 10.50$ ,  $p < .001$ , accounting for 2.2% of the variance,  $\eta_p^2 = .022$ . Post hoc contrasts specified that people in the group with a failed sense of belonging ( $M = 3.36$ ) report significantly less academic satisfaction than those in the normalized group ( $M = 3.67$ ) and successful ( $M = 3.80$ ), a decrease of 18.2% ( $r = -.182$ ) and 25.6% ( $r = -.256$ ) in academic satisfaction, and with a margin of error of 35.6% (PIS = .356) and 29.8% (PIS = .298), respectively.

Finally, and with regard to the perception of justice of the academic outcomes, an ANOVA 2 (gender: male vs. female) X 3 (sense of belonging: failed, normalized, successful) was carried out with a full factorial design, the results showed that women and men estimated equally  $F(1, 994) = 0.14$ , *ns*, that the evaluation obtained in the subjects reflects performance, while the sense of belonging mediate differences in the relationship between evaluation and academic performance,  $F(2, 994) = 9.68$ ,  $p < .001$ , accounting for 1.9% of the variance,  $\eta_p^2 = .019$ . Post hoc comparisons specified that the people in the group with a failed sense of belonging ( $M = 3.47$ ) report a significantly lower correspondence between the evaluation obtained and performance than those in the normalized ( $M = 3.72$ ) and successful ( $M = 4.00$ ) group, 18.2% ( $r = -.124$ ) and -27.0% ( $r = -.270$ ) of less correspondence with the degree, and with a margin of error 40.1% (PIS = .401) and 28.8% (PIS = .288), respectively; and those of the normalized group less than those of the successful one, 14.4% less and with a probability of error of 38.6% (PIS = .386).

## DISCUSSION AND CONCLUSIONS

Before proceeding with the discussion of the results, the study design limitations will be exposed, in the light of which the interpretation and generalization of the results should be considered. First, the sampling procedure used limits the representativeness of the sample and, consequently, the generalization of the results. Second, as the sense of belonging to the community is a complex and multidimensional construct, the validity of the measurement is not robust (Ahn & Davis, 2020). Third, the measure of the academic involvement variable was evaluated with an *ad hoc* instrument, meanwhile the academic satisfaction with the degree and the perception of justice of the academic outcome with an item. Although these variables are commonly measured with this methods (construct validity), there is not an empirical evidence to estimate the magnitude of the measure of the construct (validity). Fourth, the study design did not control a potential effect

of social desirability (strange variable) on the responses of the subjects (variance attributable to the measurement method, not to the measured construct) in the measures of well-being and academic involvement (Fariña et al., 2017).

Having these limitations in mind, in the first place, the results revealed a relationship between the sense of belonging and the three types of well-being analyzed. In a generic way, the sense of belonging was positively associated with higher rates of well-being, so that the more successful the membership, the person will tend to increase rates of happiness and positive affectivity, and satisfaction with the academic setting and with income and material possessions. The results of this study are in line with the literature advertising of the association between sense of belonging and subjective perception of psychological well-being (Toikko & Pehkonen, 2018). The findings of the present study extend this effect to virtual communities; in such a way that participation in them could contribute to supplement, or at least alleviate, the deficits or deficiencies of participation in physical communities as a consequence of the vicissitudes of the frenetic and technological contemporaneity (Allen et al., 2021). On the other hand, and as an additional benefit, the positive impact of the sense of belonging on well-being may provide an improvement in other areas and skills (indirect effects). In this sense, psychological well-being has been related to the development of optimal academic outcomes and higher levels of personal growth (Cabanach et al., 2016). In the present study, it was found a relationship between the sense of virtual belonging and the subjective perception of material well-being, i.e., the perceived economic and material situation, which is a critical marker for the personal growth and development of university students, mainly when it refers at the time and material resources available (Howell & Buro, 2015).

Second, a relationship between the sense of belonging and academic involvement was verified, characterized by a generic trend that the greater the sense of belonging, the higher the quotas of academic involvement. Likewise, the analysis of the variables related to the evaluation of the quality of teaching (ANECA, 2021), academic satisfaction and the perception of justice of the academic outcomes, exhibited the same relation with the sense of belonging. Thus, failed membership was associated with lower overall academic satisfaction; and, in turn, the perception of justice of this group of the academic results, that is, the perception of correspondence between the evaluation obtained and performance, was lower than that of the normalized and successful groups, while that of the latter group was higher than that of the normalized one. Hence, these findings showed that the sense of belonging to the community, in this virtual case, impacts on the academic functioning of the students, in the sense that a good belonging contributes positively to academic involvement, satisfaction with studies and the perception of having received fair evaluations. This evidence was consistent with previous studies that highlighted its influence on academic performance and success, and

even specifically at the scale of virtual communities (Cacho et al., 2020; Goodenow, 1993; Pedler et al., 2022).

Third, in relation to the gender factor, the results revealed no effects for this factor in sense of belonging, academic satisfaction and the perception of academic justice of the academic outcomes. Nonetheless, the results showed significant main effects in academic well-being and academic involvement. Succinctly, women reported a higher academic well-being and academic involvement (i.e., more volunteer work, high positive attitude towards classes, more class attendance). Nevertheless, participation in classes was lower for females. Complementarily, the research exhibited differences between men and women in domains of psychological and cognitive functioning (Cañamero et al., 2021; Moral-Jiménez & González-Saez, 2020; Novo et al., 2015), as well as in the academic level (Bonnevillie-Roussy et al., 2017; Corrás et al., 2017; Fariña et al., 2020; López-Larrosa et al., 2019; Ruiz-Hernández et al., 2020).

In conclusion, the results of this research showed the importance of considering and enhancing the sense of belonging to the community, and more specifically to virtual communities, in academic contexts. In this sense, with regard to virtual communities, technology could enhance academic involvement and involvement in the university community (Bond et al., 2020). Therefore, actions aimed at developing and promoting successful membership should be implemented to contribute to improving, on the one hand, the well-being of university students and, on the other, variables related to the quality of teaching such as academic involvement, academic satisfaction and the perception of justice of the academic outcomes. Interventions that promote integration and relevance in virtual communities could increase academic satisfaction and reduce the probability of dropping out (Pedler et al., 2022), as well as prevent social exclusion and its negative impacts, as reported by previous research in university contexts (Soria & Stebleton, 2013). Moreover, a failed membership could lead to antisocial or disavowal behaviors as alternative ways of achieving social recognition and approval (Allean et al., 2021), and even more serious consequences such as self-harm or suicidal behavior (Assavedo et al., 2016). In this way, the adequate development of the sense of belonging fosters psychological balance (Carrera and Wei, 2017; Chu et al., 2017). Additionally, the sense of belonging increases well-being (Pedler et al., 2022), and this is related to personal growth, optimal academic outcomes, and participation in class (Cabanach et al., 2016; Novo et al., 2020). In addition, well-being together with the adjustment of the students is important, not only for access and permanence in the university career, but also contributes to reducing the intention to leave the educational system. Thus, having verified the relationship that the sense of belonging has on these factors, it is imperative that universities contribute to promoting a sense of belonging in students (Strayhorn, 2015) and, according to some research (Brunsting et al., 2018), in general, and in particular in student mobility programmes, in order to minimise

social exclusion and anticipate situations of frustrated belonging (Chu et al., 2017). These measures and actions should be deployed from a gender perspective in order to match needs and optimise their success (Liu et al., 2017).

Finally, it should be borne in mind that higher education contributes to both the economic and social development of societies, including among its purposes, in addition to creating a broad base of advanced knowledge, preparing students for active citizenship and promoting their personal development (COE, 2007). The renewed agenda of the European Commission [EU] (2018) for higher education has made it a priority to create inclusive and connected education systems, but this integration of the students will hardly be achieved without a sense of community and belonging to the community (Knekta et al., 2020). Finally, future literature should be focused to establish the relationship between failed membership with externalizing (e.g., antisocial/disavowal behavior) and internalizing mental health problems (e.g., adjustment disorder) (Allen et al., 2021). Moreover, the lack of research on academic virtual communities suggests the need of increase knowledge about gender differences in relation to virtual communities (Liu et al., 2017) and in relation to technology use too.

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