International Journal of Mental Health and Addiction

Being There: A Preliminary Study Examining the Role of Presence in Internet Gaming Disorder

--Manuscript Draft--

Manuscript Number:	
Full Title:	Being There: A Preliminary Study Examining the Role of Presence in Internet Gaming Disorder
Article Type:	Brief Reports
Keywords:	Internet Gaming Disorder; Video gaming; Presence; Immersion; Emerging adulthood
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Funding Information:	
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Being There: A Preliminary Study Examining the Role of Presence in Internet Gaming Disorder

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Abstract

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Keywords: Internet Gaming Disorder; Video gaming; Presence; Immersion; Emerging adulthood

Author Disclosure Statement

Compliance with Ethical Standards

Funding:

There was no funding

Authors' Contribution:

VS contributed to the literature review, hypotheses formulation, data collection and analyses, and the structure and sequence of theoretical arguments

TB contributed to the literature review, hypotheses formulation, data collection and analyses, and the structure and sequence of theoretical arguments

CB contributed to the theoretical consolidation of the current work and revised and edited the final manuscript

RG contributed to the theoretical consolidation of the current work

MG contributed in revisions and editing of the final manuscript

Conflict of Interest:

The authors of the present study do not report any conflict of interest.

Ethical Standards – Animal Rights:

All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed consent:

Informed consent was obtained from all individual participants included in the study.

Confirmation Statement:

Authors confirm that this paper has not been either previously published or submitted simultaneously for publication elsewhere.

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Internet Gaming Disorder (IGD) has been introduced as an emerging mental health condition requiring further study. Associations between IGD and gaming presence (i.e., absorption in the virtual environment) have been implied. The aim of the present study was twofold: (a) to evaluate the extent to which presence contributes to IGD severity and, (b) to examine longitudinal differences in IGD according to the initial level of presence experienced. The participants comprising 125 emerging adults aged 18 to 29 years completed either: (i) three face-to-face assessments (one month apart, over three months) or (ii) a cross-sectional, online assessment. IGD was assessed with the nine-item IGD Scale Short Form and presence was assessed using the Presence Questionnaire. Regression and latent growth modelling analyses were conducted. Findings demonstrated that the level of gaming presence related to IGD severity but not to linear change in severity over a three-month period. The study shows that emergent adults who play internet games may be at a high risk of IGD given a more salient sense of being present within the gaming environment. Clinical implications considering prevention and intervention initiatives are discussed.

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Introduction

Excessive online gaming use is a social and mental health phenomenon with implications for emerging adults (ages 18-29; Author, 2011; Author, 2016a; Kuss, Louws, & Wiers, 2012) . Internet Gaming Disorder (IGD) was introduced as a condition for further study in the most recent (fifth) edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013). The proposed disorder has been defined as the continuous and ongoing use of playing online games leading to significant impairment or distress (APA, 2013). However, there are a number of online game genres that may impact on IGD susceptibility, with Massively Multiplayer Online (MMO) games being consistently associated with IGD (Lemmens & Hendriks, 2016; Stetina, Kothgassner, Lehenbauer, & Kryspin-Exner, 2011; Ng & Wiemer-Hastings, 2005). MMO games are online worlds that constantly evolve in real time, where players may interact within the game via their virtual characters (avatars), and potentially addressing shared group and/or personal goals (Stetina et al., 2011). Progressive challenges are intertwined with a well-developed reward schedule, enriched with opportunities for online socialization and character development (Thorens, Wullschleger, Khan, Achan, & Zullino, 2012). These inherent MMO factors within the game structure appear to contribute to their absorbing nature (Lemmens & Hendriks, 2016; Stetina et al., 2011; Ng & Wiemer-Hastings, 2005; Thorens et al., 2012)

Psychosocial factors that have been proposed as IGD risks range from those that are identity related (e.g., role playing, identity-building, and exploration; Kuss et al., 2012) to those involving self-esteem drives (Bessiere, Seay, & Kiesler, 2007; King & Delfabbro, 2014; Author, 2016; Yee, 2006; Author, 2017). These individual factors are important for understanding both IGD phenomenology as well as understanding the critical aspects of human-computer interaction that have emerged in relation to Internet gaming (Author, 2016). Although prior studies have indicated that immersion in the online environment is related to

more problematic play (Author, 2004), exploration into the degree of presence in the game is nascent (Milani et al., 2017).

Presence is defined as a psychological state, or a subjective perception, in which an individual may experience the game context as real, feeling as 'being there' instead of 'being here' (Huang, Chiu, Sung, & Farn, 2011). Therefore, presence within MMOs may serve as a way to transition gamers into a parallel state wherein their perception of reality might fade into the background of their consciousness (Author, 2013; Kaczmarek & Drazkowski, 2014). Within the gaming context, subjective experiences of presence are thought to progressively strengthen the sense of the game world being real, which could in turn increase online gaming involvement (Stetina et al., 2011; Huang et al., 2011; Kaczmarek & Drazkowski, 2014). This concurs with cross-sectional findings indicating presence as a factor in Internet abuse (Kuss et al., 2012; Huang et al., 2011; Kaczmarek & Drazkowski, 2014). Within the context of online play, the repeated experiences of presence can result in a feeling of belonging to the game environment (Author, 2013). This sense of belonging and 'being there' may act as an incentive to increase, and maintain online activity, thus resulting in excessive use (Author, 2013; Author, 2009).

Masten's Risk and Resilience Framework (RRF) has previously been adapted to investigate IGD phenomenology (Author, 2009; Masten, 2001), and used to identify factors that might contribute to the adaptive or maladaptive use of games. This framework has also been applied to other technological addictions, as it has been recognized that excessive Internet use alone does not indicate addiction (i.e., an individual can be highly engaged, but not addicted; Author, 2016b). The RRF suggests that behaviors constantly fluctuate across the pathological and/or non-pathological range, with their intensity being defined by the longitudinal interplay between individual (e.g., game genre preference; Eichenbaum, Kattner, Bradford, Gentile, & Green, 2015; Elliott, Golub, Ream, & Dunlap, 2012) and contextual

(i.e., offline or online) effects (Masten, 2001; Dougl et al., 2008). Given the background of immersion as a risk factor for problematic play, the notion of virtual presence in the game is examined in the present study as a potential IGD risk (Faiola, Newlon, Pfaaf, & Smyslova, 2013).

These issues are particularly salient for emerging adults (i.e., those aged 18-29 years) due to specific developmental goals and needs present during this period of transition from adolescence to full adulthood (Author, 2011; Author, 2016a; Kuss et al., 2012). Unsupervised Internet use, along with the lack of matured adult-type roles (prominent through the developmental period of emerging adulthood), appear to pose gamers at higher risk of IGD (Kaczmarek & Drazkowski, 2014; Scott & Porter-Armstrong, 2013; Hendriks, 1990; Stanley, 2015). The identification of emerging adulthood as a vulnerable developmental period is consistent with findings in other domains of substance and behavioral addictions (Kaczmarek & Drazkowski, 2014; Scott & Porter-Armstrong, 2013; Hendriks, 1990; Stanley, 2015). Accordingly, the present study will seek to build upon the current empirical understanding of IGD within this high-risk population (i.e., emerging adult MMO gamers).

The present study

Although prior literature has identified immersion as a risk factor for IGD, the longitudinal association of online presence and IGD has not been explicitly examined (Milani et al., 2017). This preliminary study utilized an RRF perspective to assess the effect of presence on IGD symptomology in a high-risk population of young adults who play MMO games. More specifically, presence was explored as it related to IGD both (i) cross-sectionally, and; (ii) as a predictor of IGD across a three-month period.

Method

Participants

The sample comprised 125 MMO players aged 18-29 years old (64 online, cross-sectional respondents, M_{age} = 23.34, SD = 3.39, Males = 49, 77.6%; 61 offline, face-to-face, longitudinal, M_{age} = 23.02, *SD*= 3.43, Males= 47, 75.4%). Online and face-to-face data (i.e., time-point 1 [T1]) were combined [a] in the cross-sectional analyses and face-to-face longitudinal data[b] (i.e., time-points 1, 2, 3 [T1, T2, T3]). The data were then analyzed separately to assess presence as a predictor of IGD over a three-month period (in consensus with the frequently used time bracket of assessing short-term changes in other types of addiction forms; Giovanni et al., 2014; D'Amico et al., 2015). Sociodemographic characteristics of the sample are presented in Table 1. The estimated maximum sampling error with a size of 125 is 8.77% and therefore, within the acceptable limits (Salant & Dillman, 1994).

-Table 1 and Figure 1-

Measures

A battery of scales and a series of demographic information questions were applied[d].

The *Internet Gaming Disorder Scale – Short Form 9 (IGDS-SF9)* was used to assess IGD severity. The IGDS-SF9 includes nine items reflecting the DSM-5 IGD criteria (e.g., *"Do you systematically fail when trying to control or cease your gaming activity?"*; APA, 2013; Author, 2015) Items are addressed on a 5-point Likert scale (1=never to 5=very often) yielding total scores ranging from 9 to 45 with higher scores indicating higher IGD severity. Internal reliability in the present study was high, with a Cronbach's α of .92.

The *Presence Scale* was used to assess online presence (Faiola et al., 2013). This includes presence (Author, 2009). The scale comprises ten self-report items which focus on the participants' experience in the virtual environment (e.g., *"I feel like all my senses are*

engaged in the environment"). Items are rated on a 5-point Likert scale (1=very little to 5= very much). Item scores are added resulting to a range between 10 and 50, with higher scores indicating higher levels of perceived presence. Internal reliability in the present study was high, with a Cronbach's α of .82.

Procedure

Ethics approval was received from the research team's university ethics committee. Participants were recruited in the general community using both offline methods (i.e., information flyers) and online methods (i.e., email, social media)[d]. The face-to-face, longitudinal component of the study was conducted over a three-month period, with the three time-point assessments completed between June 2016 and September 2016. Data collection was identical between the three time-points and participants' data were matched using a re-identifiable code.

For online collection, eligible individuals interested in participating and unable or unwilling to attend face-to-face testing sessions were invited to register with the study via a *SurveyMonkey* link available on MMO websites and forums (i.e., http://www.ausmmo.com.au). The link directed them to the plain language information statement where they had to digitally provide informed consent (by clicking a button).

Results

Linear regression analyses were conducted to assess cross-sectional presence scores predicting IGD severity. Bootstrapping on the minimum recommended level of 1000 was applied (Berkovits, Hancock, & Nevitt, 2000). Results indicated that the slope of the regression line was statistically significant[c] ($F_{(1, 123)}$=31.54, p<.001). Regarding the overall effect, 20% of the variance of IGD scores was explained by gaming presence (R^2=0.204). The standardized coefficient (β) indicated that a standard deviation increase in presence was

associated with a 0.45 standard deviation increase in IGD (b = 0.42, SE $_{(b)}$= 0.7, β= 0.45 , t = 5.61, p < .001).

Second, a latent growth model (LGM) of IGD behaviors over the three time-points (face-to-face data available only) was calculated using robust maximum likelihood estimation with *M-plus* software, Version 6.12 (Muthén & Muthén, 2010). This approach allowed IGD behaviors at different time-points to be evaluated so that the mean and the variance of the intercept (the initial status of IGD behaviors as measured at T1) and the growth function (change of IGD behaviors across the time-points) were produced. IGD behaviors at the three time-points were fixed at 0, 1 and 2 respectively, to define a linear growth model with equidistant time-points. As part of the parameterization, the intercepts of IGD behaviors at the three time-points were fixed at 0 and their residual variances were freely estimated. The chi-square goodness of fit[f] (discrepancy index), the root mean square error of approximation[g] (RMSEA-discrepancy index), the comparative fit index[h] (CFI-incremental fit index), the Tucker Lewis index[i] (TLI-incremental fit index), the Akaike information criterion[j] (AIC-information theory goodness of fit) and the Bayesian information criterion[k] (BIC-information theory goodness of fit) were calculated in order to determine overall model fit. Second, the presence score at T1 was added as a time invariant covariate (predictor) of the IGD intercept and slope. Model fit indices were compared between the two models. Missing values were addressed with full information maximum likelihood (Schafer & Graham, 2002).

A path diagram of the final LGM model is shown in Figure 2. This includes the latent growth curve with intercept (I), linear parameter (S) and the time invariant covariate of presence (pqtott). The observed variables were the repeated measures of IGD behaviors, obtained at the three time-points: Initial (T1), one month after the baseline measurement (T2), and two months after the initial assessment (T3).

-Figure 2-

Mean and standard deviation ratings for IGD severity at 0, 1 and 2 months were 19.49 (7.02), 18.71 (6.84) and 17.93 (5.91), respectively. The growth curve model was conducted twice, with presence as a time invariant covariate, and without presence. Analyses indicated that the model which included presence provided better fit than the model without (AIC and BIC values decreased; see Table 2). Presence at T1 failed to predict the IGD-slope, however, it significantly associated with the IGD-intercept (b=0.369; p<.001). Therefore, presence significantly predicted the *initial* IGD scores, but it was not predictive of change over a three-month period.

-Table 2-

Discussion

The present study utilized the RRF, enriching it with key factors from the IGD literature, to explore presence as an IGD risk factor. In line with the relevant findings, MMO gamers who experienced higher presence presented with higher IGD scores (Author, 2013). The contribution of presence to IGD was notable, as it accounted for over 20% of IGD variance. These empirical findings substantiate presence as an important IGD risk factor.

Although cross-sectional analyses did indicate presence as an IGD risk factor, the growth model did not support that the initial levels of presence related to change in IGD scores over the three-month period. This may either indicate that; (a) other factors (e.g., cognitive or personality traits of the gamer) influence the relationship between IGD and presence, or that; (b) the study duration needs to be more prolonged for the relationship to be apparent. Consequently, the results of the present study should be considered as a first step examining the relationship between presence and IGD. Future studies may consider a parallel growth model assessing the level of change of presence in relation to the level of change of

IGD to examine the relationship between the relative slopes of IGD and presence over time. Due to statistical limitations related to the sample size of the present study (i.e., model convergence) such a model could not be examined here. Nevertheless, the present findings may have important clinical implications for MMO gamers presenting with IGD.

A strong perception of the online world as real may increase the time spent gaming, and thus magnify potential problems in real life (e.g., education/occupation underperformance/problems; Author, 2016). Furthermore, the experience of the gamer as being present in-game, should be therapeutically considered because IGD associates with known motivational contributors (e.g., escapism and immersion; Kuss et al., 2012; Bessiere et al., 2007; Yee, 2006). Presence and immersion within virtual worlds will continue to dominate the gaming landscape via the introduction of more immersive technologies (e.g., virtual reality, realistic in-game graphics in game; Author, 2016). It might be important that clinical work further explores what impact this may have on an individuals' desire to engage with MMO games, and to what extent.

The findings and implications should be considered in relation to the limitations of the study. First, the self-selected sample was mostly male, therefore, the results from a non-representative sample cannot be generalized to female gamers or gamers more generally. In addition, the longitudinal design spanned only a few months, which may not be enough time to provide insight into the associations examined. Similarly, potentially confounding factors related to game use were not addressed (e.g., gaming time). Thirdly, the data were self-report and subject to many well-known biases (including memory recall and social desirability). Despite these limitations, the present study had significant strengths, such as combining online and FTF participants, cross-sectional and longitudinal analyses, and emphasized and an under-researched high-risk population (i.e., emerging adult MMO gamers). In such a context, future research could benefit from the exploration of the over-time interplay of other

game-related risk factors, such as flow or user-avatar associations. Furthermore, potential protective factors related to the gamer and/or their real context (i.e., peer and family relationships) could also be explored, allowing for a more holistic understanding of IGD.

Author Disclosure Statement

Compliance with Ethical Standards

Funding:

There was no funding

Authors' Contribution:

Author 1 contributed to the literature review, hypotheses formulation, data collection and analyses, and the structure and sequence of theoretical arguments

Author 2 contributed to the literature review, hypotheses formulation, data collection and analyses, and the structure and sequence of theoretical arguments

Author 3 contributed to the theoretical consolidation of the current work and revised and edited the final manuscript

Author 4 contributed to the theoretical consolidation of the current work

Author 5 contributed in revisions and editing of the final manuscript

Conflict of Interest:

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Author References

Author, 2004

Author, 2005

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Footnotes

a. To ensure that there were no significant differences between the online and face-to-face samples considering their demographic and Internet use characteristics, as well as the variables used in the present study, independent sample t-tests and chi-square analyses were conducted. Findings did not indicate any significant differences in regard to gender (x^2 =.21, *df*=1, *p*=.89), the type of game genre (i.e., MMOs without role development vs MMOs with Role Development) played (x^2 =2.59, *df*=1, *p*= .61), the age of the participants (*t*= -.54, *df*=120, *p*=.59), their years of internet use (*t*= 2.35, *df*=122, *p*=.06) and their reported level of onlinepresence (*t*= -1.595, *df*=119, *p*=.113). Therefore, online and face-to-face data (i.e., TP1) were combined (i.e., analyzed together) for the cross-sectional analyses.

b. The longitudinal design was assessed for attrition. Assessments' frequency for each participant varied within a range of 1-3 ($M_{average}$= 2.57). T1 comprised 61 participants, T2 comprised 56 participants (8.20% attrition) and T3 comprised 43 participants (29.51% attrition). In line with literature recommendations, attrition, in relation to the studied variables, was assessed using Little's Missing Completely At Random test (MCAR), which was insignificant[37] (MCAR X^2=1715.79, p=1.00; Little & Rubin, 2014). In order to avoid list-wise deletion, which would reduce the sample's power, maximum likelihood imputation (five times) of values was applied (Gold & Bentler, 2000).

c. To ascertain that the data collection type did not confound the association between presence and IGD scores, the linear regression analysis (bootstrapping at 1000) of presence predicting IGD was additionally conducted separately for the online [F(1, 63) = 10.12, p=.003, R2=.17, b= 0.44, SE (b)= 0.14, t= 3.18, p= .003] and the face to face [F(1, 60) = 14.59, p=.000, R2=.20, b= 0.38, SE (b)= 0.10, t= 3.82, p= .000] data resulting to similar findings with those of the unified sample. Furthermore, a moderation analysis was conducted using the process software (Hayes, 2012). The model examined the potential moderating effect of the data collection type (0= online, 1= face to face) on the association between presence (IV) and IGD (DV). Results indicated that presence and the type of data collection did not significantly interact in predicting IGD score [b = .06, SE=0.17, t(543) = .34, p = .731, (Lower Level Confidence Interval= -.273 Upper Level Confidence Interval=.388)].

d. The current study is part of a wider project of [redacted for review] that addresses the interplay between individual, Internet and proximal context factors in the development of Internet Gaming Disorder symptoms among emerging adults. Instruments used in the data include the: (1) Internet Gaming Disorder 9- Short Form (Author, 2015); (2) Beck Depression Inventory – 2nd edition (21 items; Beck, Steer, & Brown, 1996); (3) Beck Anxiety Inventory (21 items; Beck & Steer, 1990); (4) Hikikomori-Social Withdrawal Scale (5 items; Teo et al.,

2015); (5) Attention Deficit Hyperactivity Self-Report Scale (18 items; Kessler et al., 2005); (6); Ten Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003); (7) The Balanced Family Cohesion Scale (7 items; Olson, 2000); (8) Presence Questionnaire (10 items; Ratan & Hasler, 2010); (9); Online Flow Questionnaire (5 items; Chen, Wigand, & Nilan, 2000); (10) Self-Presence Questionnaire (Ratan & Hasler, 2010); (11) The Gaming-Contingent Self-Worth Scale (12 items; Author, 2016) and; (12) Demographic and Internet Use Questions. The battery of questionnaires was utilized for both online and face-to-face data collection. The use of the fitness tracker (Fitbit flex) was used only for face-to-face data collection. Data have not been used in any previous published studies.

e. In line with the approval received by the ethics committee of [redacted for review], the flyers: a) indicated that participants were required to participate on three separate measurement occasions approximately one month apart; b) included an email address to contact the investigators; and c) clearly described the process and stages of the data collection (face-to-face and online). MMO and MMORPG players, aged between 18-29 years old, interested in the study received the Plain Language Information Statement (PLIS). The PLIS clearly indicated that participation was voluntary and that participants could independently decide to withdraw from the study at any point. Individuals who choose to participate were required to provide informed consent.

f. The model is regarded as acceptable If the chi-square is not significant. That is, the observed covariance matrix is similar to the matrix predicted by the model. However, this index is disregarded when the sample size exceeds 200 and in cases that the assumption of multivariate normality is violated.

g. The RMSEA, represents the square root of the average or mean of the covariance residuals (the differences between corresponding elements of the observed and predicted covariance

matrix). Zero represents a perfect fit. Literature indicates that RMSA should be less than .08 (Browne & Cudeck, 1992) - and ideally less than .05 (Stieger, 1990). Alternatively, the upper confidence interval of the RMSEA should not exceed .08 (Hu & Bentler, 1998).

h. The CFI compares the examined model of interest with the null or independence model (variables are assumed to be uncorrelated). In this context, the CFI represents the extent to which the model of interest is better than is the independence model. Values that approach 1 indicate acceptable fit. CFI is not too sensitive to sample size (Fan, Thompson, & Wang, 1999).

i. The TLI is computed by the division of the chi square for the target model and the null model by their corresponding df vales (relative chi squares), which are then subtracted from each other and their difference is finally divided by the relative chi square for the null model minus 1. According to Marsh, Balla, and McDonald (Marsh, Balla, & McDonald, 1988), the TLI is relatively independent of sample size and over .90 or over .95 are considered acceptable (Hu & Bentler, 1998).

j. The AIC is regarded as an information theory goodness of fit measure--applicable when maximum likelihood estimation is used (Anderson, Burnham, & White, 1998). This index is used to compare different models. Like the chi square index, the AIC also reflects the extent to which the observed and predicted covariance matrices differ from each other. Models that generate the lowest values are optimal.

k. The BIC is similar to the AIC, and expresses the log of a Bayes factor of the target model compared to the saturated model and penalises against complex models. Furthermore, a penalty against small samples is included in BIC calculation (Raftery, 1995).

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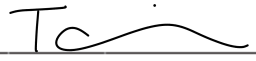
Category for Disclosure	Description of Interest/Arrangement

Author Name Tyone Burleigh

Article Title Being There: A Preliminary Study Examining the Role of Presence in Internet Gaming Disorder

Author Signature  Date 18/12/17

http://www.springer.com/journal/11469

International Journal of Mental Health and Addiction
Editor-in-Chief: Zangeneh, M.
ISSN: 1557-1874 (print version)
ISSN: 1557-1882 (electronic version)
Journal no. 11469

Table 1

-Table 1. *Sociodemographic Characteristics of the Participants in the Study*-

Sociodemographic Variables		Face to Face (n = 61)	Online (n = 64)	Total (n = 125)
Gender	Male	45 (36.0%)	49 (39.2%)	94 (75.2%)
	Female	16 (12.8%)	15 (12.0%)	31 (24.8%)
Game Genre	MMOs	38 (30.4%)	43 (34.4%)	81 (64.8%)
	MMORPGs	23 (18.4%)	21 (16.8%)	44 (35.2%)
Highest level of Education	Year 7-10	4 (3.2%)	2 (1.6%)	6 (4.8%)
	Year 12	25 (20.0%)	21 (16.8%)	46 (36.8%)
	Tertiary Diploma	15 (12.3%)	17 (13.9%)	32 (26.2%)
	Undergraduate Degree	12 (9.8%)	15 (12.3%)	27 (22.1%)
	Postgraduate Degree	5 (4.0%)	9 (7.2%)	14 (11.2%)
Employment Status	Unemployed	1 (0.8%)	11 (8.8%)	12 (9.6%)
	Temporary Leave	2 (1.6%)	2 (1.6%)	4 (3.2%)
	Student	14 (11.2%)	10 (8.0%)	24 (19.2%)
	Casual Employment	15 (12.0%)	8 (6.4%)	23 (18.4%)
	Part-Time Employment	9 (7.2%)	8 (6.4%)	17 (13.6%
	Full-Time Employment	20 (16.0%)	25 (20.0%)	45 (36.0%)
Residing with	Family of origin (two parents and siblings if any)	11 (9.1%)	23 (19.0%)	34 (28.1%)
	Mother and siblings if any (parents divorced/separated)	2 (1.7%)	5 (4.1%)	7 (5.8%)
	Mother and siblings if any (father passed away)	2 (1.6%)	1 (0.8%)	3 (2.4%)
	Father and siblings if any (parents divorced/separated)	0 (0.0%)	1 (0.8%)	1 (0.8%)
	With partner	18 (14.9%)	16 (13.2%)	34 (28.1%)
	With partner and siblings	1(0.8%)	1 (0.8%)	2 (1.7%)
	Alone	1 (0.8%)	3 (2.5%)	4 (3.3%)
	With friends	13 (10.4%)	6 (4.8%)	19 (15.2%)
	Shared accommodation	13 (10.4%)	8 (6.4%)	21 (16.8%)

Table 2

-Table 2. *Model(s) Fit information*-

	X^2	df	P	CFI	TLI	RMSEA	AIC	BIC
Model 1 (without Presence as a covariate)	.000	1	.983	1.00	1.01	.000	5594.85	5624.61
Model 2 (with Presence as a covariate)	2.806	2	.246	.99	.99	.036	5519.67	5556.88

Figure 1

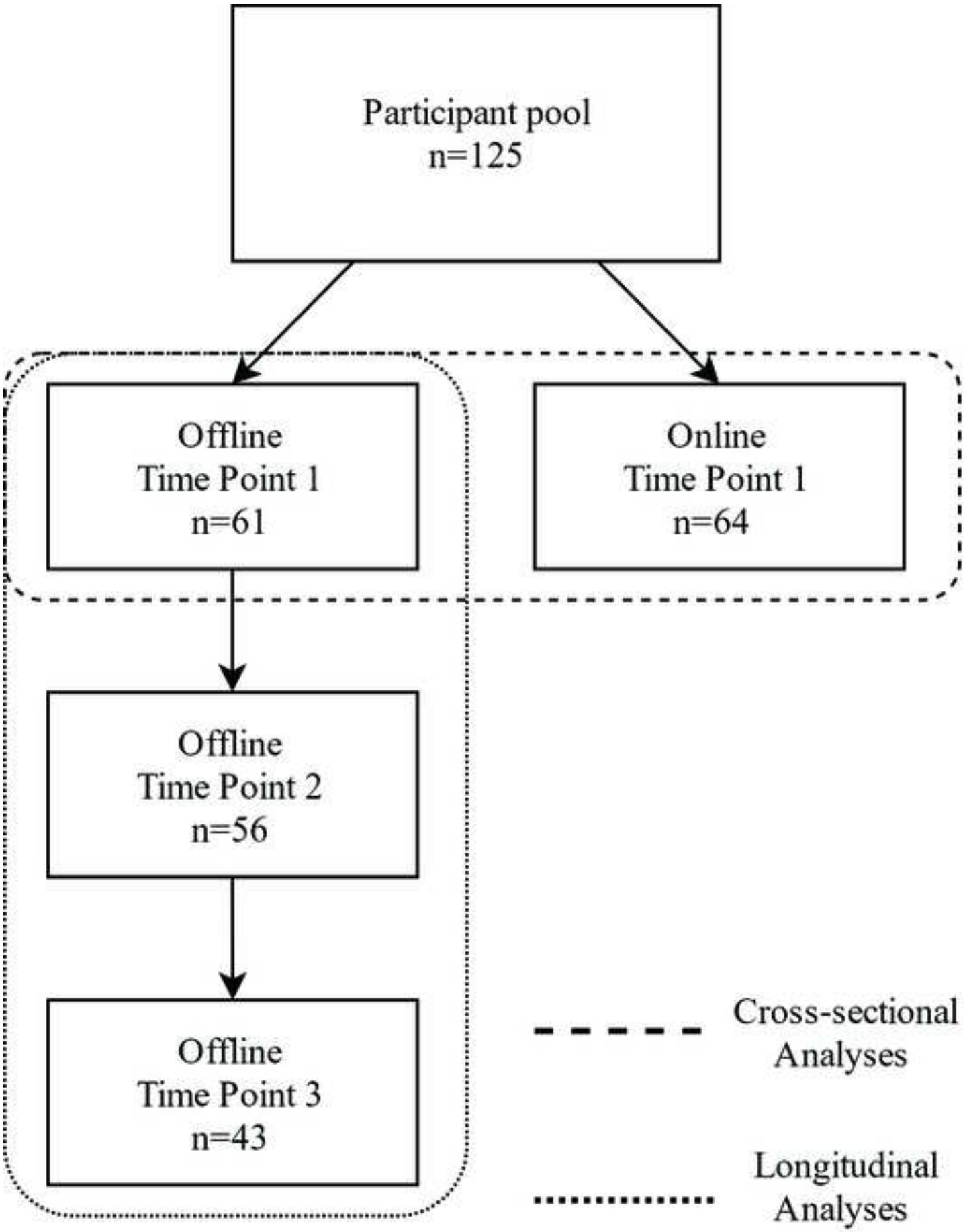
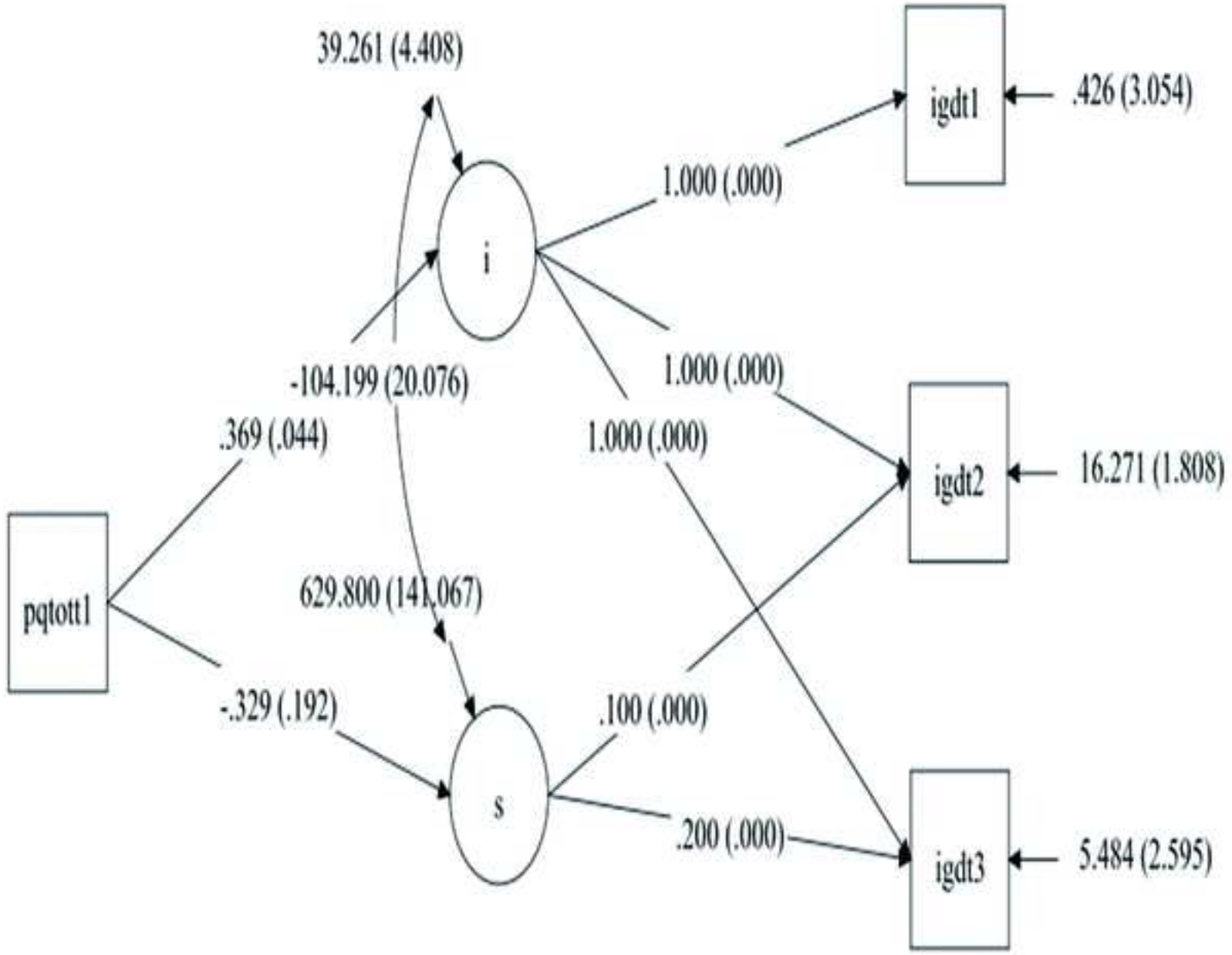

Participant pool
n=125
Offline
Time Point 1
n=61
Online
Time Point 1
n=64
Offline
Time Point 2
n=56
Offline
Time Point 3
n=43
Cross-sectional
Analyses
Longitudinal
Analyses

Figure 2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igdt1
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1.000 (.000)
i
1.000 (.000)
-104.199 (20.076)
1.000 (.000)
.369 (.044)
igdt2
16.271 (1.808)
pqtott1
629.800 (141.067)
-.329 (.192)
.100 (.000)
s
.200 (.000)
igdt3
5.484 (2.595)