

Abstract

This is a review and analysis of the questionnaires most used in empirical research about psychological phenomena labelled as “presence,” “flow,” and “narrative absorption,” mostly for experiences mediated by technology (printed books, screens for games and films, and virtual reality). The items of each questionnaire are categorized based on their wordings, thus independently from the conceptual models within which they have been developed. Overlapping concepts have been formulated in different fields according to specific disciplinary interests and based on knowledge within each field, this review focuses on how language is actually used in questionnaire items, rather than on how concepts are formulated top-down and arbitrarily associated with corresponding linguistic expressions that become items of a questionnaire. The goal is to highlight similarities and overlaps in order to show the aspects for which an interdisciplinary dialogue could bring concrete improvements to different research fields. Based on this categorization, various domains to which the items can be ascribed are identified (e.g. space, realism, agency, etc.) and psychological phenomena are linked to them (e.g. presence, social presence, narrative absorption, etc.).

Keywords: Presence; flow; narrative absorption; immersion; scoping review; questionnaires.

Presence, flow, and narrative absorption questionnaires: a scoping review

Experiences mediated by technology (e.g. printed books, screens, and virtual reality) are studied across a variety of disciplines, often with little cooperation. Different theorizations, models, and empirical tools have been developed, resulting in a fuzzy agglomerate of related and overlapping concepts, like presence (Lombard et al., 2015), flow (Csikszentmihalyi, 1990; Harmat et al., 2016), and narrative absorption (Hakemulder et al., 2017). In order to identify the core aspects of these various concepts, a scoping review of the questionnaires most used in empirical research about this kind of psychological phenomena has been performed. Items of each questionnaire have been categorized based on their wordings, thus independently from the conceptual models within which they have been developed. Overlapping concepts have been formulated in different fields according to specific disciplinary interests and based on knowledge within each field, this review focuses on how language is actually used in questionnaire items, rather than on how concepts are formulated top-down and arbitrarily associated with corresponding linguistic expressions that become items of a questionnaire.

The goal is to highlight similarities and overlaps between questionnaires' items in order to identify which are the most relevant aspect of the psychological phenomena labelled as "presence," "flow," and "narrative absorption." Based on this categorization, the domains to which each group of items can be ascribed (e.g. space, realism, agency, etc.) will be suggested and they will be associated to the respective psychological phenomena for which they are more frequently used (e.g. presence, social presence, narrative absorption, etc.).

Methods

Protocols and registration

The review follows the Arksey and O'Malley's framework for scoping reviews (Arksey & O'Malley, 2005), refined by Levac et al. (2010) and the Joanna Briggs Institute (Peters et al., 2015). Findings are reported here following the PRISMA-ScR (Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews) checklist (Tricco et al., 2018).

Eligibility criteria

The sources considered are questionnaires available in English, no year limit has been used. To be included in the review, questionnaires need to have been developed or used for research about one of the following media: VR, video game, film, book. Only questionnaires measuring psychological states have been included, not those measuring personality traits or broader psychological concept (e.g. empathy). Validation and statistical reliability were not necessary criteria.

Information sources

The search has been performed using three sources: the aggregator Google Scholar, the bibliography of the Society for the Empirical Study of Literature and Media (IGEL),¹ and the measurement guides provided by the International Society for Presence Research (ISPR).² Additional useful comparisons of presence-related concepts can be found in van Baren & IJsselsteijn (2004), de Oliveira & Tavares (2016), and Skarbez et al. (2017); for narrative absorption and similar concepts, see Busselle & Bilandzic (2017); for games, see Reddy (2016).

Search

Terms' queries used in Google Scholar are: "presence questionnaire," "immersion questionnaire," "flow questionnaire," "narrative questionnaire," "narrative engagement," "narrative absorption," "narrative transportation."

Selection of sources of evidence

Information about questionnaire has been obtained directly from the published articles and also from reviews included in Master theses or PhD dissertations. The criterion used to consider a questionnaire as source of evidence is its application in recent years: once a questionnaire has been identified, its use in research starting from the year 2000 has been checked.

Data charting process

When multiple versions of a questionnaire were available, only the most recent or shortest version have been considered, since these are likely to be an improvement over previous or longer versions.

Data items

Being a data-driven bottom-up review, no specific variables have been defined a priori. Rather, all questionnaires' items have been analyzed. Among the total 479 items of all questionnaires, we only grouped and categorized the items for which we found close similarities and overlap of wordings ($n = 249$).

Synthesis of results

Items of the selected questionnaires have been compared and grouped according to similarities in the wordings used. For instance, the narrative absorption item "When I was finished with reading the story it felt like I had taken a trip to the world of the story" (Kuijpers et al., 2014) strongly resembles the spatial presence item "After my experience of the displayed environment, I had a

sense that I had returned from a journey” (Lessiter et al., 2001). Once various clusters of items have been identified, each group has been labeled and linked to the most relevant psychological phenomenon. When items were already grouped in subdimension of the broader psychological construct, the subdimensions have been used as guidance for the classification.

Results

Selection of sources of evidence

The questionnaires analyzed are listed in Table 1.

Synthesis of the results

The complete categorization of the questionnaire items can be found in an online repository [reference omitted for anonymization]. A summary of the most relevant categories is reported in Table 2.

Discussion

Summary of evidence

In all questionnaires, the most frequently recurring items concern attention and the sense of time. The isolation from external thoughts and perceptions is the main characteristic of presence-related phenomena, and such disconnection from stimuli unrelated to the undergoing experience leads probably to an alteration of the sense of time. The first three groups of items identified are space, agency, and realism, which can be related to the concept of presence. Despite the evolution towards broad psychological conceptions of presence (Baños et al., 2000; Lee, 2004; Riva et al., 2015), a review (Hein et al., 2018) of the psychometric questionnaires used in VR research in the years 2016-17 found that the most used one is the Presence Questionnaire (Witmer & Singer, 1998), which heavily focuses on visual realism and naturalness of interaction.

However, the broadest and most protracted collective effort aimed at clarifying how to measure presence (Hartmann et al., 2016; Vorderer et al., 2004) has excluded realism from the subdimensions of presence, keeping only “self-location” and “possible action” as core dimensions. Similarly, the “imagery” category, relevant for items related to narrative absorption, can be considered as equivalent to the category “realism” for presence. Inquiring about the vividness of imagery or about the realism of a VR scene is a way to check how similar the imagined/mediated experience is to a non-mediated one. Both realism and vivid imagery are outcomes that can be associated to presence, but they are not particularly helpful to explain the underlying psychological processes that bring to the emergence of a sense of presence.

Many questionnaires also take into account the possibility that perceiving the existence of other agents can affect our sense of presence or, more broadly, that we can have intense experiences when interacting with others or following their actions. With a growing degree of complexity, such perception goes from merely noticing the existence of others, to interacting with them, to emotional and cognitive ways of responding to and understanding others’ mental states. These groups of items, that I associate to the concept *social presence*, often occur together with presence items and seem to entail it as the basis on top of which they can emerge. Indeed, they are all different expressions of a Self-Other relationship and can be conceptualized as forms of presence in co-participation.

Analogously, questionnaires about flow experiences include items that I have here associated to presence – and in some cases also items related to social presence – plus a specific group of questions regarding the perception of an experience as challenging. Similar wordings can be also found in items of narrative and game questionnaires.

Items that I specifically associated to the concept of narrative absorption regard imagery, the feeling of suspense triggered by the narrated events, and the comprehension of the content of the story, an aspect which can be connected to the sense of challenge of flow experiences, since the right match between the complexity of a story and the cognitive skills of the reader is relevant for narrative absorption. It is worth noting that questionnaires investigating narrative absorption include these three groups but also items related to presence and social presence (with characters of a story), which can be considered subdimensions of narrative absorption. In addition to the mentioned phenomena, some items explicitly ask whether an experience elicited involvement, engagement, immersion, or absorption. Given the metaphorical nature of such terms, they are not particularly useful for describing the psychological processes activated during the experiences they aim at qualifying. Moreover, “immersive” is used in VR research as a technical attribute of the medium – consistently with Sheridan seminal definition (1992) – whereas in game and narrative studies it is a quality of the player or reader’s experience (Jennett et al., 2008; Ryan, 2015).

Based on the recognition presented, a cross-disciplinary systematization of concepts is possible. To sum up, attention and time distortion are common to all the considered phenomena, and presence (space and agency) is the phenomenon with the narrowest scope, the core. Social presence and narrative absorption are phenomena of increasingly broader scope, each of them including the phenomena of narrower scope. Flow is a concept transversal to the other three, being more related to the balance between a person’s skills and the complexity of the stimulus, rather than to a specific category.

References

- Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, 8(1), 19–32.
<https://doi.org/10.1080/1364557032000119616>
- Baños, R. M., Botella, Cristina, C., Garcia-Palacios, A., Villa, H., Perpiña, C., & Alcañiz, M. (2000). Presence and Reality Judgment in Virtual Environments: A Unitary Construct? *CyberPsychology & Behavior*, 3(3), 327–335.
- Brockmyer, J. H., Fox, C. M., Curtiss, K. A., McBroom, E., Burkhart, K. M., & Pidruzny, J. N. (2009). The development of the Game Engagement Questionnaire: A measure of engagement in video game-playing. *Journal of Experimental Social Psychology*, 45(4), 624–634. <https://doi.org/10.1016/j.jesp.2009.02.016>
- Busselle, R., & Bilandzic, H. (2009). Measuring narrative engagement. *Media Psychology*, 12(4), 321–347. <https://doi.org/10.1080/15213260903287259>
- Busselle, R., & Bilandzic, H. (2017). Beyond metaphors and traditions. Exploring the conceptual boundaries of narrative engagement. In F. Hakemulder, M. M. Kuijpers, E. S. Tan, K. Bálint, & M. M. Doicaru (Eds.), *Narrative Absorption* (pp. 11–27). John Benjamins.
- Cheng, M.-T., She, H.-C., & Annetta, L. A. (2015). Game immersion experience: Its hierarchical structure and impact on game-based science learning: Impact of immersion on learning. *Journal of Computer Assisted Learning*, 31(3), 232–253.
<https://doi.org/10.1111/jcal.12066>
- Cohen, J. (2001). Defining Identification: A Theoretical Look at the Identification of Audiences With Media Characters. *Mass Communication and Society*, 4(3), 245–264.
https://doi.org/10.1207/S15327825MCS0403_01

- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper Collins.
- de Oliveira, R. P., & Tavares, T. F. (2016). Measurement Methods for Phenomena Associated with Immersion, Engagement, Flow, and Presence in Digital Games. *São Paulo*, 9.
- Fu, F.-L., Su, R.-C., & Yu, S.-C. (2009). EGameFlow: A scale to measure learners' enjoyment of e-learning games. *Computers & Education*, 52(1), 101–112.
<https://doi.org/10.1016/j.compedu.2008.07.004>
- Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology*, 79(5), 701–721.
- Hakemulder, F., Kuijpers, M. M., Tan, E. S., Bálint, K., & Doicaru, M. M. (Eds.). (2017). *Narrative Absorption*. John Benjamins.
- Harmat, L., Ørsted Andersen, F., Ullén, F., Wright, J., & Sadlo, G. (Eds.). (2016). *Flow Experience: Empirical Research and Applications*. Springer International Publishing.
<https://doi.org/10.1007/978-3-319-28634-1>
- Harms, C., & Biocca, F. (2004). Internal Consistency and Reliability of the Networked Minds Measure of Social Presence. In M. Alcañiz & B. Rey (Eds.), *Seventh Annual International Workshop: Presence 2004* (p. 7).
- Hartmann, T., Wirth, W., Schramm, H., Klimmt, C., Vorderer, P., Gysbers, A., Böcking, S., Ravaja, N., Laarni, J., Saari, T., Gouveia, F., & Maria Sacau, A. (2016). The Spatial Presence Experience Scale (SPES): A Short Self-Report Measure for Diverse Media Settings. *Journal of Media Psychology*, 28(1), 1–15. <https://doi.org/10.1027/1864-1105/a000137>
- Hein, D., Mai, C., & Hußmann, H. (2018). *The usage of presence measurements in research: A review*. 28.

- Heutte, J., Fenouillet, F., Boniwell, I., Martin-Krumm, C., & Csikszentmihalyi, M. (2014, October 20). *Optimal learning experience in digital environments: Theoretical concepts, measure and modelisation*. Digital Learning in 21st Century Universities, Georgia Institute of Technology, Atlanta.
- IJsselsteijn, W., de Kort, Y. A. W., & Poels, K. (2013). *The Game Experience Questionnaire*. Technische Universiteit Eindhoven.
- Jennett, C., Cox, A. L., Cairns, P., Dhoparee, S., Epps, A., Tijs, T., & Walton, A. (2008). Measuring and defining the experience of immersion in games. *International Journal of Human-Computer Studies*, 66(9), 641–661. <https://doi.org/10.1016/j.ijhcs.2008.04.004>
- Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. *Implementation Science*, 5(1), 69. <https://doi.org/10.1186/1748-5908-5-69>
- Lee, K. M. (2004). Presence, Explicated. *Communication Theory*, 14(1), 27–50.
- Lombard, M., Ditton, T. B., Crane, D., Davis, B., Gil-Egui, G., Horvath, K., & Rossman, J. (2000). *Measuring Presence: A Literature-Based Approach to the Development of a Standardized Paper-and-Pencil Instrument*. 14.
- Lombard, M., Biocca, F., Freeman, J., IJsselsteijn, W., & Schaevitz, R. J. (Eds.). (2015). *Immersed in Media: Telepresence Theory, Measurement & Technology*. Springer.
- Makransky, G., Lilleholt, L., & Aaby, A. (2017). Development and validation of the Multimodal Presence Scale for virtual reality environments: A confirmatory factor analysis and item response theory approach. *Computers in Human Behavior*, 72, 276–285. <https://doi.org/10.1016/j.chb.2017.02.066>

- O'Brien, H. L., & Toms, E. G. (2013). Examining the generalizability of the User Engagement Scale (UES) in exploratory search. *Information Processing & Management*, 49(5), 1092–1107. <https://doi.org/10.1016/j.ipm.2012.08.005>
- Peters, M. D. J., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews: *International Journal of Evidence-Based Healthcare*, 13(3), 141–146. <https://doi.org/10.1097/XEB.0000000000000050>
- Qin, H., Patrick Rau, P.-L., & Salvendy, G. (2009). Measuring Player Immersion in the Computer Game Narrative. *International Journal of Human-Computer Interaction*, 25(2), 107–133. <https://doi.org/10.1080/10447310802546732>
- Reddy, G. S. H. (2016). *Empirical Investigation on Measurement of Game Immersion using Real World Dissociation Factor*. Blekinge Institute of Technology.
- Rheinberg, F. (2008). Intrinsic motivation and flow-experience. In H. Heckhausen & J. Heckhausen (Eds.), *Motivation and Action* (pp. 323–348). Cambridge University Press.
- Rigby, J. M., Brumby, D. P., Gould, S. J. J., & Cox, A. L. (2019). Development of a Questionnaire to Measure Immersion in Video Media: The Film IEQ. *Proceedings of the 2019 ACM International Conference on Interactive Experiences for TV and Online Video - TVX '19*, 35–46. <https://doi.org/10.1145/3317697.3323361>
- Riva, G., Mantovani, F., Waterworth, E. L., & Waterworth, J. A. (2015). Intention, Action, Self and Other: An Evolutionary Model of Presence. In M. Lombard, F. Biocca, J. Freeman, W. IJsselsteijn, & R. J. Schaevitz (Eds.), *Immersed in Media* (pp. 73–99). Springer International Publishing. https://doi.org/10.1007/978-3-319-10190-3_5
- Ryan, M.-L. (2015). *Narrative as virtual reality 2: Revisiting immersion and interactivity in literature and electronic media* (Second edition). Johns Hopkins University Press.

- Schubert, T. W. (2003). The sense of presence in virtual environments: A three-component scale measuring spatial presence, involvement, and realness. *Zeitschrift Für Medienpsychologie*. <https://doi.org/10.1026/2F1617-6383.15.2.69>
- Shen, L. (2010). On a scale of state empathy during message processing. *Western Journal of Communication*, 74(5), 504–524. <https://doi.org/10.1080/10570314.2010.512278>
- Sheridan, T. B. (1992). Musings on Telepresence and Virtual Presence. *Presence: Teleoperators and Virtual Environments*, 1(1), 120–126. <https://doi.org/10.1162/pres.1992.1.1.120>
- Skarbez, R., Brooks, Jr., F. P., & Whitton, M. C. (2017). A Survey of Presence and Related Concepts. *ACM Computing Surveys*, 50(6), 1–39. <https://doi.org/10.1145/3134301>
- Thissen, B. A. K., Menninghaus, W., & Schlotz, W. (2018). Measuring Optimal Reading Experiences: The Reading Flow Short Scale. *Frontiers in Psychology*, 9, 2542. <https://doi.org/10.3389/fpsyg.2018.02542>
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., ... Straus, S. E. (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Annals of Internal Medicine*, 169(7), 467–473. <https://doi.org/10.7326/M18-0850>
- Usoh, M., Catena, E., Arman, S., & Slater, M. (2000). Using Presence Questionnaires in Reality. *Presence: Teleoperators and Virtual Environments*, 9(5): 497–503. <https://doi.org/10.1162/105474600566989>.
- van Baren, J., & IJsselsteijn, W. (2004). *Measuring Presence: A Guide to Current Measurement Approaches* [OmniPres project IST-2001-39237]. <https://pdfs.semanticscholar.org/308b/16bec9f17784fed039ddf4f86a856b36a768.pdf>

- Vorderer, P., Wirth, W., Gouveia, F. R., Biocca, F., Saari, T., Jäncke, L., Böcking, S., Schramm, H., Gysbers, A., Hartmann, T., Klimmt, C., Ravaja, N., Sacau, A., Baumgartner, T., & Jäncke, P. (2004). *MEC Spatial Presence Questionnaire (MEC- SPQ): Short Documentation and Instructions for Application* (p. 14). Project Presence: MEC (IST-2001-37661). <http://www.ijk.hmt-hannover.de/presence>
- Wiebe, E. N., Lamb, A., Hardy, M., & Sharek, D. (2014). Measuring engagement in video game-based environments: Investigation of the User Engagement Scale. *Computers in Human Behavior*, *32*, 123–132. <https://doi.org/10.1016/j.chb.2013.12.001>
- Witmer, B. G., & Singer, M. J. (1998). Measuring Presence in Virtual Environments: A Presence Questionnaire. *Presence: Teleoperators and Virtual Environments*, *7*(3), 225–240. <https://doi.org/10.1162/105474698565686>
- Witmer, B. G., Jerome, C. J., & Singer, M. J. (2005). The Factor Structure of the Presence Questionnaire. *Presence: Teleoperators and Virtual Environments*, *14*(3), 298–312. <https://doi.org/10.1162/105474605323384654>

Footnotes

¹https://www.zotero.org/groups/2082627/igel_bibliography/collections/MKV5U8RJ/items/ENQ266EI/collection

²<https://ispr.info/about-presence-2/tools-to-measure-presence/>

Tables

Table 1

Questionnaires analyzed and categorized. Total number of items, n= 479.

Questionnaire	Type	Number of items
1 Temple Presence Inventory (TPI) (Lombard et al., 2000)	Presence	42
2 Slater, Usoh and Steed (SUS) (Usoh et al., 2000)	Presence	6
3 Sense of Presence Inventory (ITC-SOPI) (Lessiter et al., 2001)	Presence	38
4 Igroup Presence Questionnaire (IPQ) (T. W. Schubert, 2003)	Presence	14
5 Networked Minds Social Presence Inventory (NMSPI) (Harms & Biocca, 2004)	Presence	34
6 Presence Questionnaire, version 3 (PQ) (Witmer et al., 2005)	Presence	29
7 Spatial Presence Experience Scale (SPES) (Hartmann et al., 2016)	Presence	8
8 Multimodal Presence Scale (MPS) (Makransky et al., 2017)	Presence	15
9 Flow Short Scale (FSS) (Rheinberg, 2008)	Flow	13
10 EduFlow Scale (EFS) (Heutte et al., 2014)	Flow	12
11 Reading Flow Short Scale (RFSS) (Thissen et al., 2018)	Flow	8
12 EGameFlow (EGF) (Fu et al., 2009)	Game/Flow	42
13 Immersion in the Narrative Game Questionnaire (INGQ) (Qin et al., 2009)	Game	27
14 Game Engagement Questionnaire (GEQ) (Brockmyer et al., 2009)	Game	19
15 User Engagement Scale (UES) (O'Brien & Toms, 2013; Wiebe et al., 2014)	Game	31
16 Game Experience Questionnaire (GExQ) (IJsselsteijn et al., 2013)	Game	40
17 Game Immersion Questionnaire (GIQ) (Cheng et al., 2015)	Game	14
18 Transportation Scale (Green & Brock, 2000)	Narrative	11
19 Identification Scale (J. Cohen, 2001)	Narrative	10
20 Narrative Engagement Scale (NES) (Busselle & Bilandzic, 2009)	Narrative	12
21 State Empathy Scale (SES) (Shen, 2010)	Narrative	12
22 Story World Absorption Scale (SWAS) (Kuijpers et al., 2014)	Narrative	18
23 Film Immersion Questionnaire (FIQ) (Jennett et al., 2008; Rigby et al., 2019)	Narrative	24

Table 2

Categorization of items (n = 249) from presence, flow, game, and narrative questionnaires.

Total items	Scales with item	Item type	Category	Main psychological phenomenon
22	12	Attention (no external thoughts)	Attention	Attention
17	9	Attention (no external perceptions)		
17	11	Time distortion	Time	–
17	9	“Being there” (feelings and perceptions, not thoughts)	Space	Presence
8	5	Realities overlapping		
5	3	Closeness of story world		
6	5	Return to reality		
5	5	Being part of the action (also partly overlaps with "being there")		
10	5	Possibility of action in space	Agency	Presence
6	4	Control of content		
5	3	Control of medium		
9	6	Naturalness/fluency of medium use		
9	6	Perceived realism	Comparison	
4	2	Attention to another agent	Attention	Social presence
4	3	Co-location with another agent	Space	
9	3	Mind reading	Cognition	
5	2	Behavioral response to another agent	Agency	
14	7	Matching of another agent 's emotions	Emotion	
4	3	Feelings for another agent	Emotion/Cognition	
5	4	Connection with another agent		
9	5	Understanding of another agent (perspective taking, cognitive empathy)	Cognition	
10	6	Challenge	Cognition	Flow
8	4	Vividness of imagery	Comparison	Narrative absorption
12	5	Comprehension of content	Comprehension	
7	4	Suspense/anticipation	Emotion/Cognition	
13	7	Explicit use of involvement/engagement terms	Metaphor	–
9	8	Explicit use of absorption/immersion terms		